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XLIV

FLIGHT

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FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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The Outlook

Decisive Factors

THE present war has turned out very different from the last one. Very seldom does one war follow the lines of its predecessor. Sometimes an experiment which has proved successful is copied, and the success of choosing Marshal Foch as Generalissimo of the combined French and British Armies on the Continent has formed a precedent for uniting British and other Allied contingents under one leader in various theatres of war with the happiest results.

The chief novelty in organisation adopted in the present war has been, not the uniting of Allied troops, but the placing of all three Services under one Commander-in-Chief. The nationality of the leader chosen has been a minor point, and in all cases the individual chosen has been the man who seemed most fitted to hold the position. The novelty lay in placing the selected leader in supreme command of all sea, land and air forces in the area with which he had to deal. In two cases the Commander-in-Chief has been a sailor, namely, a Dutch Admiral in the South-West Pacific in the early stages of Japan's advance, and a British Admiral in Ceylon. In all other cases the supreme authority has been invested in a soldier, and the instances of General (now Field Marshal) Wavell, General MacArthur and General Eisenhower will readily occur to the mind. None of these three soldiers has attempted to interfere with the details of the naval work of the Admirals who have nominally served under him, but the main point is that unity of command over all three Services has been accepted as a principle.

Inter-Service jealousy is a very undesirable thing, which has sometimes hampered warlike operations in the past. In this war no signs of it have been apparent, and the accepted practice of unity of command has probably been partly responsible for its absence—though we prefer to believe that patriotism and enthusiasm for the cause, combined with the wider outlook of modern officers and men, have had even more to do with it. On all battle fronts the sailors, soldiers and airmen have pulled together, helping each other and full of admiration for the work of the others. Only on the top rungs of the official ladders have signs of jealously occasionally made their appearance. Controversies have sometimes started about what is the "decisive factor" in war.

Whenever a new weapon is discovered, enthusiasts always appear who proclaim that it is the decisive factor. Probably in the dim dawn of history the tribe which first learnt to ride horses proclaimed hotly that mounted cavalry would always be the decisive factor. In more recent times the same claim was made by some for the torpedo (and Hitler still banks on it). Now it is being made for aircraft.

Words of Wisdom

IN such discussions it is important to keep clear in the mind the distinction between what is indispensible and what is decisive. In a tank, for example, there are doubtless many minute parts, each of which is indispensible, but none of which could be called decisive in battle. Likewise in war, especially in the amphibious style of war which Britain and America must now wage, many arms are indispensable, but only a proper co-ordination of them all can be decisive.

It is reported from North-West Africa that General Spaatz, who commands the Air Forces there, has made a speech in which he is said to have expounded the theory that air power is the decisive factor in war. He may hold that theory, but he is evidently no fanatic, for, speaking of Pantellaria, he is reported to have remarked that it would be unwise to imagine that any

place, regardless of its defences, could be similarly reduced.

Almost at the same time General Marshall, Chief of Staff of the U.S. Army, made a speech at Columbus, Ohio, in which he warned the Conference of Governors against "hasty conclusions regarding the utilisation of air power or any special weapon in the conduct of this war," and went on to say that the case of Pantellaria was unique as to the character of the island, the quality of the garrison, the complete naval control of the surrounding waters, and the proximity of Allied airfields. He concluded: "Your adversary may be hammered to his knees by bombing, but he will recover unless the knock-out blow is delivered by the ground Army, with infantry and artillery as important as tanks and aircraft, and engineer and signal troops vital to the whole."

Those were words of wisdom. Aircraft are indispensable to any campaign by land or by sea, and unless one's fighters can command the air no success can be expected. But the decisive factor is a well-balanced force of all arms.

Future of Air Transport

AS the representative body of the British aircraft industry the Society of British Aircraft Constructors is intimately concerned in the future of British civil air transport no less than in the development of service aviation. It stated its considered views on the former in a memorandum issued last Friday. A summary is given on page 7 of this issue, from which it will be gathered that the main conclusions arrived at by the S.B.A.C. is that subsidies have failed in the past to provide that service and progress which the Empire is entitled to expect; that monopolies should be avoided in the future; and that State aid should be in the form of payment for services rendered, and not as subsidies.

A review of the period between the Hambling report of 1923, which led to the formation of what *Flight* somewhat unpopularly called the "Million Pound Monopoly Company," viz., Imperial Airways, and the outbreak of war in September, 1939, lends force to the S.B.A.C. argument. Neither the monopoly nor the form of subsidy had the desired results.

That all countries in Europe may be expected to have learnt their lesson from past experience is, perhaps, too much to expect, but unless hidden subsidies are abolished the merry game is likely to start all over again.

It is full early to discuss such matters. The picture of post-war Europe is much too vague. But there are many post-war problems which are the particular concern of the countries of the British Commonwealth of Nations. These could and should be discussed at once. No post-war plan which does not take full account of the needs and wishes of the Empire, and which does not take the Empire into full partnership, can have the slightest hope of success.

That section of the S.B.A.C. Memorandum which deals with post-war aircraft is in complete agreement with views expressed in *Flight*. It visualises three main stages: the immediate post-war period, in which modified service types will have to be used; a second period, in four to five years from now, in which aircraft designed with operational needs in view should come into use; and the long-range policy in which such developments as jet propulsion, all-wing aircraft, and boundary layer control will be applied. We think the S.B.A.C. somewhat pessimistic in its estimate of ten years for this.

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ON NEUTRAL GROUND: Douglas C47s (DC3s) and Consolidated C87s (Liberators) of British Overseas Airways Corporation on the new Lisbon airport.

WAR in the AIR

Americans Bomb the Ruhr: Great Flight by Heavy Bombers : The King in the Desert : Bombing Economics

AIR POWER : The last stages in the air bombardment of Pantellaria before the island finally capitulated.

STEADILY the American bombing effort is growing, despite the distance of the operational base in the British Isles from the factories in the United States. For heavy bombers to operate far from the sources of supply always imposes difficulties; and, as was explained in an article in last week's issue of *Flight*, the policy of the Eighth Air Force of the U.S. Army is, in popular parlance, not to bite off more than it can chew. In other words, it will not risk casualties at a greater rate than the rate of replacements. However, on June 22nd the Eighth Air Force made a daylight raid on a town in the Ruhr, Huls by name, as well as attacking targets near Antwerp.

Bomber Command has continued its methodical devastation of Ruhr towns and cities, and great havoc was wrought at Krefeld and Mülheim, among other places. The attack on Krefeld was concentrated into 50 minutes, and at one time bombs of the 4,000 lb. category were going down at the rate of five a minute. The raiding force lost 54 bombers. On these bright summer nights the main defence is by fighters rather than by A.A. guns, and the concentration of German fighters in the West and South-East of Europe helps the Russians by depriving the *Luftwaffe* on the Eastern Front of the fighter cover which is essential if command of the air is to be obtained. The fires at Krefeld and Huls were burning 24 hours after the raiders had left.

Though we all lament the losses of fine bombers and their gallant crews, we must always remember that these losses are small when compared with those of an army in a great battle, and that the damage done to the German war effort is cheap at the price. Moreover, the German attempts at reprisals have proved much more expensive in machines. A comparison may be made, taking as a criterion the weight of bombs dropped for the number of machines lost. On the night of May 23rd Bomber Command dropped roughly 2,000 tons on Dortmund in one hour and lost 38 machines. In the first 170 days of the present year nearly 1,400 German aircraft crossed the coasts of Britain, roughly half of them being Fw 190s carrying bombs In that period the Germans dropped little more than 1,000 tons and lost 211 machines.

In line astern stepped down. A Norwegian Northrop N-P.3 seaplane as seen from another Northrop in formation. The aircraft are of the Norwegian naval squadron operating in Iceland.

Profit and Loss

THOUGH fighter-bombers are far less costly than four-engined bombers, and though the former are single-seaters, the German method seems extravagant. They need more fighters badly on all their fronts, and the damage which the fighter-bombers have done to Britain cannot be compared with that inflicted on Dortmund. Many of the German bombs were dropped at random on the countryside. The loss of 211 machines, even though many of them were comparatively cheap single-seaters, paid very poor dividends.

It must not be thought that the British bomber offensive is exclusively confined to the Ruhr. There have been many recent attacks on places outside that area, Friedricshafen on Lake Constance being a recent example. Probably no one knows exactly how German industry is now distributed, and some students of the subject think that a greater proportion of it than has been generally believed now lies outside the Ruhr. Of course, the more widely distributed German production is, the longer the time will be before the efforts of Bomber Command result in German armies going into battle definitely short of some vital weapon. The only sign of that so far has been a shortage of fighters on the Russian front, but that shortage is probably comparative rather than absolute. Whatever the facts at the moment may be, the Ruhr is still a great centre of German arms production, probably the greatest of them all, and to smash it

up methodically must sooner or later produce an effect on the fighting power of the German forces.

Surprising the Axis

THE raid on Friedrichshafen mentioned above turned out a surprise for the Axis as well as for the public at home. The name of the place recalls to many of us some poignant emotions of the last great war. It was then the home and nest of the once-dreaded Zeppelins. The damage which they did in Britain seems paltry now, after recent experience of blitzing by the *Luftwaffe*, but in 1914-15 their raids seemed things of dread. For centuries before the Englishman's home had been his castle, and, thanks to the watch and ward of the Royal Navy, no foreign foe had ever been able to interfere with it. It came as a shock to realise that homes might be wrecked and citizens killed despite the guard of the "inviolable sea." So the name of Friedrichshafen was accursed of Britons, and once the Royal Naval Air Service actually sent three Avro 504s to bomb the sheds!

Zeppelins are no longer built in the sheds on the shore of Lake Constance, but those sheds are still used as a war factory. So Bomber Command sent a force of heavy bombers to upset the proceedings, and they devastated at least three acres and put a stop to the activities of the Maybach engine works. The attack came as a surprise, and the defence was not effective. None of the British bombers was brought down. An unfortunate tragedy connected with the attack was that some of the shells, or shell fragments, from the German A.A. guns came to earth on the Swiss side of the frontier and killed a few Swiss people. The British were not to blame for that, but none the less we all regret the tragedies, as the Swiss have always been our very good friends.

After the raid the British bombers vanished from German ken, and the observer posts and A.A. gunners all over the tracts to the north must have been excessively puzzled to account for their disappearance. What they did was to turn south instead of north, and fly on to Africa, where they landed. It is rather over 500 miles from England to Friedrichshafen, and for that distance the raiders were carrying their bombs. The rest of the flight was made light, but it must have covered over 750 more miles.

The crews spent three days in Africa, and doubtless rejoiced in the plentiful supplies

WAR IN THE AIR

of fruit and eggs there. After the unusual coolness of early June in England this year, the extra sun and warmth of Africa was probably also not unwelcome. In the meantime the bombers were serviced and loaded up with new bombs.

Then they set off for home again, and on the way made another raid on the Italian naval base at Spezia, not far from Genoa. Again a surprise seems to have been brought off, and more damage was done to the base. It is to be hoped that Italian warships in the harbour may have been hit, while other shipping was most probably damaged. Having once more got rid of their heavy bomb load, the machines then crossed the Alps and flew back home, landing on airfields in Northern England. Not one of the bombers failed to return.

OVER THE SHARP END: A sequence of pictures as a Grumman Wildcat overshoots while trying to alight on the deck of U.S.S. *Altamaha*, one of the "Woolworth" aircraft carriers for escort duties.

Altogether, this was a surprising adventure. It was economical in wear and tear of airframes and engines, as well as in fatigue of crews. It struck hard and unexpected blows at two important Axis centres. Above all, it showed the versatility and resourcefulness of the staff of Bomber Command, of which several examples have been given before. There is nothing cut-and-dried about its methods. It may for a while induce the enemy to think that it has adopted a regular routine, and then it does something quite out of the ordinary and takes him by surprise. He must always be trying to guess what the next surprise will be.

Accolade in the Desert

HIS MAJESTY THE KING has been having a very busy time in the Mediterranean. His visit to Malta gave great pleasure to everyone. Apart from the actual defenders of the island, the whole Empire has been filled with intense admiration for the spirit of the brave Maltese, and the honour and pleasure of having the King in their midst must have been no small compensation for all the sufferings which they have so stoutly endured.

The Eighth Army also well deserved a special visit from the King—the Fountain of Honour, as constitutional histories call the wearer of the British Crown. One pictures the forces which fought in the desert as having reached the climax of informality, to be the greatest contrast imaginable to the Guards when they troop the Colours on a King's Birthday parade in London in times of peace. Yet even in the desert the King's visit was accompanied by some of the picturesque ceremonial which is connected in most minds with feudal times. On a parade in the desert Air Marshal F. J. Linnell, Deputy A.O.C.-in-C., the Middle East, knelt before the King, received the accolade (it must have been not too easy to find a sword in the desert), and rose up as Sir Francis.

Darwin Air Battle

THE Japanese recently made another attempt at a large-scale raid on Darwin, sending over 28 bombers and an escort of 20 fighters. Evidently the number of Spitfires in Australia has been increased since the fight in which a lot of them chased their opponents so far out to sea that they had not enough fuel left to get back themselves. This time the enemy raiders were met by a force of Spitfires roughly equal to their own strength, and the

WAR IN THE AIR

ENEMY AIR LOSSES TO JUNE 26th

	Over G.B.	Continent	Middle East	N.W. Africa
June 20	0	0	1	16
" 21	1	0	20	8
" 22	0	0	0	0
" 23	0	0	1	0
" 24	0	0	1	21
" 25	0	0	0	21
" 26	0	0	1	2
	1	0	24	68

Totals: West, 7,045; Middle East, over 5,393; North West Africa, 2,177.

result was a foregone conclusion. The Spitfires decisively accounted for eight bombers and four fighters, and ten Japanese aircraft were last seen struggling and straggling away, losing height and with smoke pouring out of them. Only two Spitfires were lost, while the damage done by the bombs was described as minor.

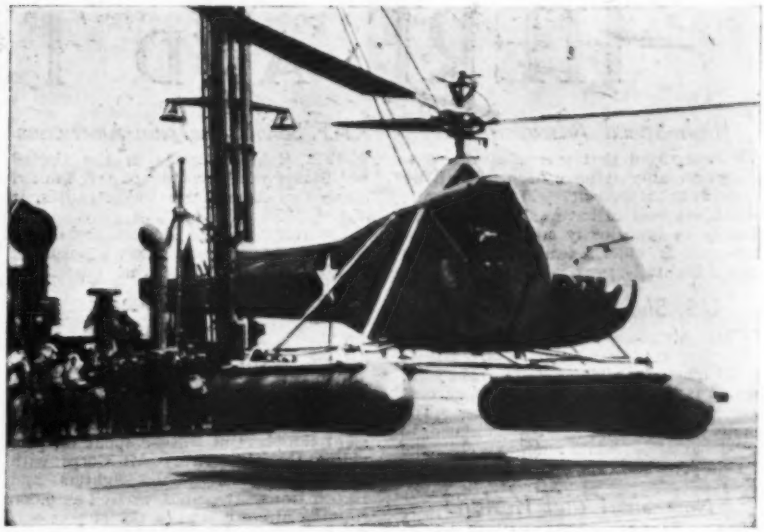
An Aerial Week-end

OVER last week-end there was no major fighting by sea or land forces on any of the fronts where the United Nations confront the Axis and Japan. All the news was about air activity in every theatre. Russian infantry no doubt engaged in skirmishing and patrol activity, and under the Atlantic U-boats tried to do what they could to interfere with the shipping convoys between America and Britain, while under the Mediterranean British submarines certainly kept up their very effective attacks on the Axis ships which tried to persuade themselves into the belief that Mussolini's boast about *Mare nostrum* still had some force. They tried to forget a less ancient but more potent saying that Britannia rules the waves.

ON THE WAY: A close-up of a stick of paratroops jumping from a Douglas C47 in the Middle East.

Air activity filled all the news columns of the papers and the B.B.C. broadcasts throughout the week-end. It was divided into two classes of operations. There was the long-term policy of hammering German production which was energetically followed by the R.A.F. and the American Eighth Air Force, and there was bombing which may have more immediate consequences in the Mediterranean and in the Pacific. In the Mediterranean much of the work was done by General Doolittle's Strategic Air Force, while the R.A.F. Middle East Command joined in. But there are occasions when it is not easy to draw a sharp line between what is strategic action and what is tactical. The hammering of the air bases and ports of the enemy in the islands and on the Italian mainland had all the appearance of an artillery bombardment such as often precedes a battle. In 1918 that bombardment often lasted for days before the British and French infantry started to climb over the top and advance against the German trenches; yet the gunfire was certainly tactical in nature. The same sort of procedure took place for some days before the Eighth Army advanced at Alamein, only then the battering of the enemy was shared by the artillery and the Air Force. In the recent operations the targets have been outside the range of the land guns, and so the work has been done almost entirely by aircraft. Bombers, of course, have played the main part, but fighter-bombers have contributed their share in striking at targets within their range, and fighters from Malta have also taken a hand by shooting up trains and communications generally in Sicily. The train ferry between Messina and Reggio has come in for especially heavy and repeated hammering. While the news of the widespread bombing comes in day after day everyone, in Italy and Germany as well as in Allied countries, is all agog to hear news of the next advance by the Allies, for which this air activity must surely be the preparation.

Expectations also run high in the Pacific. American bombers are tackling the Japanese in the Aleutian islands seriously, while down in the South-west the Australians and Americans under General MacArthur strike out right and left. One very fine flight of 2,000 miles out and back was made by a force of Liberators to bomb Macassar in the Celebes Islands to the south-east of Borneo. A cruiser was probably hit.



WHEN THE STORMY WINDS DO BLOW? A Sikorsky R4 helicopter demonstrating how it can take off and land on the 20ft. square deck of a tanker in Long Island Sound. A special landing technique will be required when the tanker is pitching and tossing in an Atlantic swell.

BRITISH & U.S. AIR LOSSES to JUNE 26th

	Over G.B. A'crft.	Continent B'brs.	Continent F'trs.	Middle East A'crft.	N.W. Africa A'crft.
June					
20	0	0	4	1	4
21	0	44	3	0	2
22	0	50	5	0	1
23	0	0	0	0	2
24	0	34	4	0	9
25	0	48	0	0	3
26	0	6	7	0	0
	0	190	23	1	21

Totals: West, 6,621; Middle East, about 2,097; North West Africa, 769.

HERE AND THERE

High Speed Administration

IT is reported that several special passenger aircraft have been ordered by President Roosevelt. The aircraft, which are said to have extra long range and to be luxuriously equipped, are for the use of chief executives when on global flights.

U.S. Sheet Metal Factory

THE Aluminium Company of America has completed the second largest sheet metal mill in the world. The mill, which is in the vicinity of Chicago, cost £12,000,000 and occupies 55 acres. The factory has been primarily designed to produce alloy aluminium sheets, the "skin" of bombers and fighters.

New Short and Harland Appointment

MR. DENNIS E. WISEMAN has been appointed general manager with Mr. W. P. Kemp, of Short and Harland, Ltd., Belfast, in order to strengthen the management of the company. The official statement says: "Mr. Wiseman, who has also been appointed a director of the company, is an industrialist of wide experence, especially of trades and labour questions, and in his new post will be responsible in particular for matters affecting wages and conditions of labour."

More Appointments

GROUP CAPT. FINLAY CRERAR has been appointed Commandant of the Royal Observer Corps, with the acting rank of air commodore. He succeeds Air Comdre. G. H. Ambler, who has been appointed Deputy Senior Air Staff Officer, Headquarters, Fighter Command.

* * *

GROUP CAPT. HAROLD J. PROUD has been appointed Inspector-General of the Indian Air Force, a step which shows the importance which is attached to this rapidly growing force. Group Capt. Proud, who entered the R.A.F. in 1926, has already seen service in India.

Aircraft Production Adviser

MR. ERIC MENSFORTH, managing director of Westland Aircraft, Ltd., is to act as chief production adviser to the Ministry of Aircraft Production. He will serve in an honorary capacity.

R.A.F. Schools to Train Americans

FIVE R.A.F. schools in the United States are now to train a limited number of American aviation cadets, it it revealed.

The American and British methods of training pilots differ in several respects, so that the results of this innovation should prove interesting.

U.S. War Bill

THE United States are proposing to spend nearly £18,000,000,000 on their army during the coming fiscal year. More than a third of this War Department Supply Bill will be spent on providing the U.S. Army Air Corps with 36,000 bombers, 38,000 fighters and 12,000 transport planes, as well as 9,000 training aircraft, and is the largest war bill in American history.

Knights in Armour

THE news that U.S.A.A.F. bomber crews are now being issued with armoured vests and aprons to protect them from *flak* splinters and shell fragments immediately makes one reflect how curious it is that in the midst of a modern mechanised war, an ancient idea should suddenly find a useful place.

It is, of course, a very sensible provision, and credit goes to Col. M. C. Grow, a surgeon of the Eighth U.S. Army Air Force, who is responsible for the development of this 20th century "chain mail."

There are two types in use, one for aircrew who have to stand, and an abbreviated type for the pilots whose backs are already protected by armoured seats.

Since the heavier cutfit only weighs 22½lb. there is no fear of its wearers having to be hoisted into their aircraft as the mediæval knights in full armour had to be hoisted on to their chargers.

A picture of these flak jackets appears on page 11.

Up and Up!

UNITED STATES aircraft production is steadily increasing. The May figure was 7,000, thus establishing another record, and Mr. Donald Nelson, Chairman of the War Production Board, has asked for 8,000 aircraft to be produced in June.

Japan's Aircraft Losses

JAPANESE aircraft destroyed in the Pacific war zone since July 31st, 1942, are reported to number 1,337. Of this total half were Zeros and a large percentage of the remainder were dive-bombers and torpedo-bombers.

Progress?

THE Institute of Transport has just issued a list of nine names of new members elected to its council to fill vacancies which will arise on October 1st this year for the ensuing 12 months.

Not one of these new members is connected with air transport, which, in view of its acknowledged importance, is as surprising as it is lamentable.

Four of them are railway men, two represent road haulage interests, two belong to municipal transport undertakings, and one is connected with inland water transport and was formerly a railway director.

The heavy preponderance of railway interests is worth noting!

Fares, Please!

A CONTINENTAL system of helicopter buses is planned by the American company known as Greyhound Bus Lines.

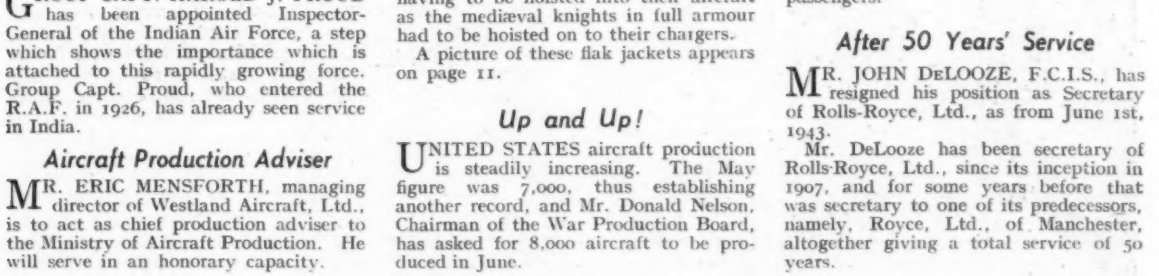
Experiments will be started as soon as permission is granted from the Civil Aeronautics Board and the necessary aircraft are available. It is not expected that the service will operate until the end of the war, but when it does the helicopters will fly over the company's present bus routes.

Igor Sikorsky is designing the helicopter bus, which will carry seven passengers, luggage and pilot. A later model is expected to carry fourteen passengers.

After 50 Years' Service

MR. JOHN DELOOZE, F.C.I.S., has resigned his position as Secretary of Rolls-Royce, Ltd., as from June 1st, 1943.

Mr. DeLooze has been secretary of Rolls-Royce, Ltd., since its inception in 1907, and for some years before that was secretary to one of its predecessors, namely, Royce, Ltd., of Manchester, altogether giving a total service of 50 years.



The Me 323 six-engined power-assisted troop-carrying glider seems to have inspired the Americans to do something similar with their 15-seater CG 4 glider. It is shown here as a twin-engined version with two horizontally opposed air-cooled engines.

S.B.A.C. and Air Transport

Its Views on the Development of British Commercial Air Transport: Abolition Urged of Subsidies and "Single Chosen Instrument" Monopoly: Need for Immediate Building of Transport Types

THE first official approach by the Society of British Aircraft Constructors as a body to the Government on the subject of British commercial air transport has been made in the form of a memorandum which was sent to the Prime Minister on Monday, June 21st, and copies of which have also been sent to the Secretary of State for Air, the Minister of Aircraft Production and the Minister of Transport.

Entitled "The Future of British Air Transport," the memorandum puts forward proposals "designed to maintain the virility and progress of British aviation," and is divided into three main sections, namely, the scope of post-war air transport, post-war conditions, and planning for post-war conditions. This last section, which is the largest, is subdivided into consideration of the following points: Empire co-operation; Ministerial control; Monopoly or competition?; Provision of air-liners; Research facilities; Training of technical staff; Airports; Licensing of internal air transport; and Operational data.

A concluding paragraph laments the fact that recommendations made by the Society in the past have gone unheeded, with the resultant adoption of policies which have adversely affected British air transport and the British aircraft industry, and calls for Government acceptance of the principle of consultation with the aircraft industry on matters of air transport policy. There is also printed as an appendix the memorandum dealing mainly with the subject of subsidies which was sent by the Society to the Secretary of State for Air in April, 1934. This was sent to the Marquess of Londonderry as a private document, and has never previously been published.

THE three main stages which the Society foresees in the development of British transport aircraft:

(a) The immediate post-war period, marked by use of aircraft derived from Service counterparts, but embodying present day experience and practice.

(b) A period which, if immediate action be taken, could begin in four to five years from now, with the coming into service of aircraft projected, it is hoped, with some regard to the needs of actual airline operators.

(c) A period beginning perhaps ten years from now, using aircraft embodying jet propulsion, full boundary layer control, flying-wing design, and so forth.

No Monopoly

Little fault can be found with the present memorandum on the score of ambiguity, for the S.B.A.C. sets forth its views and makes definite suggestions in the clearest of terms. Accepting the premise that Great Britain and the Empire must take a leading part in what will be a large post-war field for air transport operation (a point laboured almost *ad nauseam* both in and out of Parliament during the past few months), it first of all declares that there should be as much freedom of operation as possible within a framework devised to prevent armed aggression, and advocates the abolition of the single State-subsidised monopoly system in favour of a system under which air transport would be operated for commercial and economic needs, and not for reasons of security, prestige, veiled military development and strategical requirements.

Other recommendations under the heading of post-war international control include the following: that State aid to operators should be limited to payment for services rendered, such as the carriage of mails, and should not be in the form of direct payment by the State; that ground facilities, including navigational aids, meteorological information, and provision for technical landings *en route* should be the liability of States flown over by international operators; that the right to operate international airlines might be restricted to those companies which submitted their operations to full audit and control, and to the regular and frequent publication of the results of those operations; and that the intervention of Governments in technical matters should be limited by the establishment of bodies to supervise air-worthiness requirements similar to the Air Registration Board set up in Great Britain.

Immediate action is called for by the Society on a number of points which, it says, can be decided without waiting for final consultation with those of the United Nations which are not represented in the British Commonwealth.

Chief among these is the decision as to the future home of Commonwealth research, with the object of ensuring maintenance of a technical standard at least equal to that of the United States and the Soviet Union. This home, the S.B.A.C. feels, should be in Great Britain itself, as being the only State in the Commonwealth which has large research facilities, but it stresses the need for the provision, with State aid, of the larger and more costly apparatus of research needed to cope with the growing size and complexity of modern transport aircraft, and also for the encouragement at universities and in the industry of schemes designed to provide Great Britain and the Empire with an adequate and continuing supply of technicians, engineers and skilled mechanics. Lining up with this particular aspect of the subject is also a recommendation for the provision for a full interchange of operational data and experience at home as well as abroad.

Other matters which the Society believes should be settled immediately include Governmental decision on the future Ministerial control of civil aviation (concerning which it urges that control should not be removed from the Air Ministry without much thought, since this is the only Government department with some knowledge of the operational and technical complexities of air transport), abolition of the "single chosen instrument" policy to avoid the evils of monopoly, an immediate review of airport facilities in this country and the Empire, and the adoption of measures to provide Great Britain with at least one super-airport as soon as possible after the war, and a decision on the licencing of internal air services which, it suggests, should be conducted on lines similar to those governing road transport to encourage efficient, economical, safe and regular services.

It is clear from a detailed perusal of this important document that the S.B.A.C. does not oppose air competition from the shipping companies and the railways, and that it believes that the future of British air transport could not be in better hands than those of private enterprise. The latter point is evidenced in the section of the memorandum dealing with the question of "Monopoly or Competition?" in which the Society presses for an early decision from the Government on whether or not it proposes to abandon the "single chosen instrument" policy as hitherto exemplified by Imperial Airways and B.O.A.

"The Society is convinced that monopoly is inconsistent with the advancement of British civil aviation" it says, and goes on to stress the advantages, both in technical development and efficient operation, of maintaining the stimulus of competition.

D

Notes from a Test Pilot's Diary—No. 11

Oil Pressure

Why Test-bed Readings are Higher : Effect of Altitude

By "WITNESS"

HOW much simpler was the problem of oil pressure in the days before flights above 20,000ft. were common, and oil-flows through engines could be measured in pints rather than in thousands of gallons per hour.

Thanks to the installation research which has been done in this country, particularly by the "Back-room Boys" of the R.A.F. in the Engine Flight at Farnborough and by the Rolls-Royce Flight Installation Department, enough is now known about what happens in oil systems at altitude to enable trouble-free layouts to be designed into new aircraft, rather than to modify, by trial and error, an installation after it has already been completed. Obviously, in these notes it would be improper to divulge publicly all that is latest and best in the design of oil systems, but there can be no harm in indicating where that knowledge exists if those genuinely interested wish to avail themselves of it.

On the other hand, one can state the altitude/oil pressure problem in general terms, and an understanding of this is of some value in test-flying. There are several fundamental reasons why an engine, when installed in an aircraft, should give lower oil pressure for equal temperatures as compared with the test-bed. On the test-bed it is common practice to use oil tanks of considerably greater capacity than those used in aircraft, at any rate in fighters, so that the surface area from which air, emulsified in the oil, can escape is increased.

Moreover, the oil tank usually has a gravity head to the pressure pump, and pipe-lines of greater internal diameter than those fitted in aircraft are used, whilst in many aircraft the suction pump has to draw the oil uphill, especially under climbing conditions.

Again, on the return oil line from the scavenge pump to the tank, back-pressure is not usually so high on the bench as is caused by the compact aircraft oil-cooler, which is designed to make the oil give up its heat with a minimum of frontal area. Thus there is sufficient difference between bench and aircraft to account for lower pressure reading in the la.ter, even at ground level. A reduction of about 5 to 10 lb. is a normal result.

Frothing Effect

In the air more changes occur which nearly all tend to accentuate the pressure drop. The most simple effect of altitude is that if the oil tank is vented to atmosphere, the reduced pressure of the air will lower the working efficiency of the oil pressure pump. Another important result is the increased frothing tendency of hot oil when the air pressure does less and less to hold in the emulsified air. It is one thing for an oil pump to handle "solid oil" even when high temperature renders it very thin, but imagine the difficulty of trying to suck and maintain pressure with oil worked up into a froth of the same sort of consistency as the top-dressing of a pint of beer.

Oil is a fluid and for practical purposes incompressible, but air is spongy stuff and thoroughly demoralising to any oil system. Once air gets the upper hand we suffer the unhappy results which most test pilots experience at one time or another—heavy breathing, hunting of the air-screw, loss of oil pressure and, in extreme cases, emptying of the oil tank accompanied by the airscrew flying into fully fine pitch.

Air is bound to be pumped into the oil tank because, owing to the varying flight altitudes of the engine, the capacity of the scavenge pump or pumps must exceed that of the pressure pump by a substantial margin. It follows, therefore, that for every gallon of oil which is pumped into the engine, there is extraction capacity for, say, a gallon and a half or two gallons, and the deficiency of oil must be made good by air. In this way a considerable volume of air must always be carried along in the scavenge line through the oil cooler to the tank. Air is, incidentally, a bad conductor and its presence tends to lower the rate of heat flow both into and out of the oil.

Aeration Causes

Aeration to the point of lowering the oil pressure excessively at height can have either of two main origins. Aeration in the engine may tend to occur especially at high oil temperature if the pumps are, through any reason such as wear or poor assembly, down in capacity. Some engine designs allow sufficient capacity in their pumps when the clearances are small and before much wear has taken place, but there is not enough margin to take care of the reduced effectiveness of the pump after some hundreds of hours running. That is one important point which recent flying experience has proved: the oil pumps must have a sufficient excess of capacity to be able still to cope with altitude after allowing for fair wear and tear.

Aeration in the oil tank, the second possible source, is mainly the product of sticking to certain fundamental rules in oil tank design. The "hot-pot" or partial circulating chamber is unfortunately the world's worst form of container for de-aerating. The surface area on the top of the oil in the "hot-pot" is small, whereas the largest possible surface from which the air can be driven off is desirable. Moreover, there is a very rapid flow of oil into the "hot-pot" at the top and out again at the bottom, and a tendency to form a whirlpool, like the last part of a bath running out, may give air a chance to enter the suction line in quantity.

With oil tanks, much progress has been made both by building de-aerators into the tank and incorporating some form of air separator in the scavenge line. Conditions have also been assisted by pressurising the tank, so that instead of being vented to atmosphere, a valve is incorporated which allows the scavenge pump to build up a pre-determined pressure in the tank before blowing off. For military purposes, pressurised tanks are obviously undesirable, and it is always the aim, when pressurisation is inevitable, to keep the pressure figure as low as practicable.

These remarks would be incomplete without a warning concerning the two remedies which are most commonly applied after the pilot has reported low oil pressure. The first is to screw up the pressure release valve. If this is done, the initial pressure of the oil will undoubtedly be raised, but once the oil has been warmed the pressure will fall to such a value that the relief valve closes, and no advantage will be found over the range of pressures below that.

This is, however, subject to the qualification that some designs of pressure relief valves behave in a peculiar way (more like viscosity than blow-off valves) with aerated oil and it is a matter of trial and error whether screwing up the valve will, or will not, show the slightest improvement on any given engine.

The other method sometimes adopted in the hope of restoring pressure is to make a rigid inspection of the suction line for possible air-leaks at the joints. This may sound quite logical, especially as one well-known fighter has no less than twelve joints between the oil tank and the engine, but my own experience after many attempts to cure such imaginary leaks, is that this is generally a waste of time. The exceptions are, of course, when there are outward signs of leaks or if a rapid loss of oil pressure occurs high up, accentuated by cooling of the oil. In the case of an air leak, unlike all other pressure troubles, a lower oil temperature and more viscous oil will tend to break down the oil supply to the pressure pump.

Rumania's Air Force

A Medley of Obsolescent Types : An Industry of Three Firms : Heavy Losses on the Russian Front

By V. L. GRUBERG

THE Rumanian Air Force, which, together with Rumanian armies, co-operates with the Germans on the Russian front, has been for several years under the patronage of the *Luftwaffe*. Nazi fear about the security of Rumanian oil-fields has prompted them to pay special attention to the air problems of Rumania and to improve the standards of the local Air Force. Accordingly, German instructors were sent not only to train, but to reorganise, the Air Force and bring it as close as possible to *Luftwaffe* methods. Needless to say, these "instructors" were in reality *Luftwaffe* plenipotentiaries, with powers far exceeding the usual training missions, and, in effect, they are the actual controllers of the Rumanian Air Force.

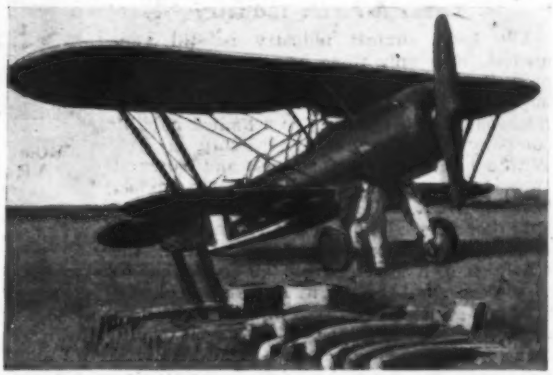
Just as in other spheres of German's collaboration with her satellites, for the purpose of outward appearance the organisation of the Air Force was left on a national and independent basis. The Rumanian Air Arm is under the command of a Rumanian officer, General Ionescu, who is also the Under-Secretary of State for Air. The latter office is, on the other hand, a part of the Ministry of National Defence, headed by Marshal Antonescu, who is the chief of combined Rumanian Air Force.

The military aviation (*Comandamentul Fortelor Aeriene*) comprises three "Air Regions" (Regiunea), and is headed by the chief of General Staff, Division General Enescu. The Under Secretary for Air is assisted by the Chief of Staff and the Services Chief, the latter being in charge of armaments, technical services, etc. The Chief of Staff's field of responsibility comprises an Air Force Command under Brig. Gen. Celáreanu and Training Command under Gen. Ionescu. The Training Command embraces one Fighter, one Bomber and one Observer Training Centre.

Organisation

The organisation of the Air Force is based on the "region," which embraces two or more air brigades, two brigades of A.A. artillery and a service and maintenance unit. Each brigade is subdivided into two or three wings, which split up again into squadrons. The anti-aircraft brigade is usually composed of two or three A.A. artillery regiments and several signal companies.

The locational distribution of the Air Force within Rumania shows a concentration in the Black Sea region: in Constanza, which is not only an important port, but is also an outlet for the oil industry, and is the centre of naval aviation. It comprises two squadrons equipped with bomber and sea reconnaissance aircraft, one fighter squadron, one bomber squadron and one reconnaissance squadron equipped with land-based aircraft. The training centres are distributed over different parts of the country with a central flying school in Tecuciu, Moldavia, two training establishments for fighter pilots in Turnu Severin, and in Buzau, an observer school at Tecuciu and two bomber schools, both situated in Central Rumania. In Bucharest itself there exists a training institute for the Air Force specialists.



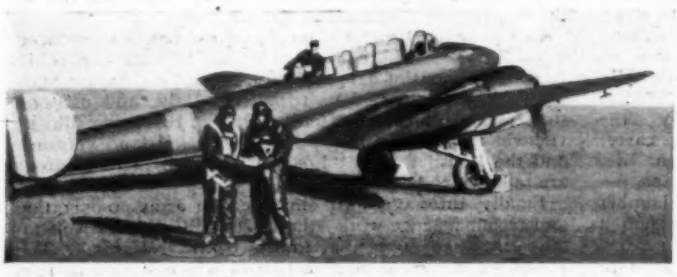
OLD-FASHIONED : The I.A.R. 39 reconnaissance aircraft has a cruising speed of 170 m.p.h. with a bomb load of 1,520 lb. and a range of 620 miles.

The total personnel strength of the Rumanian Air Force comprises about 13,000 men. Of these 1,000 are commissioned technicians, 1,500 N.C.O.s and 10,000 other ranks. It should be noted that these figures do not apply to the flying branches only, but, as is evident from the organisation of the Air Force, include the A.A. Artillery as well as auxiliary units.

Numerical Strength

The equipment strength of this Air Force does not exceed 1,000 machines. Even this figure may appear to be somewhat far-fetched, but it should be remembered that it includes training aircraft, reserve machines and obsolescent types, ambiguously called "Second Line Reserves," and virtually, in this case, belonging to third line strength. According to Italian sources, the first line strength is estimated at 700 machines, composed of 350 fighter aircraft, 150 reconnaissance army co-operation machines and 200 bombers.

The sources of equipment supply are as varied as the policy of the country. Between 1939 and 1940 14 Blenheims and also other aircraft, among them Hurricanes, were reported to have been delivered from this country. Later on, the Germans took over and supplied 40 Messerschmitts and 11 Heinkels. Still later the Rumanians profited from the Polish catastrophe; about 20 per cent. of the remaining Polish Air Force were evacuated to Rumania, which was then Poland's ally. This equipment, among which were some latish Polish types, such as the "*Łoś*" bomber and the "*Karaś*" fighter, the Rumanians retained for "keeps." Even if little has remained by now of these machines they have certainly con-



FRENCH CONTRIBUTION : The Potez 63-B2 powered with two Hispano-Suiza 14H engines of 650 h.p. each, and armed with two M.Gs. It has a maximum speed of 280 m.p.h. and a bomb load of 990 lb.

RUMANIA'S AIR FORCE

tributed to the offensive strength of Germany, for when in June, 1941—a year after the arrival of *Luftwaffe's* mission to Rumania—Marshal Antonescu marched in goose-step with the Germans against Russia, Rumanian Air Force units were despatched to the front to co-operate with the *Luftwaffe*.

Local Aircraft Industry

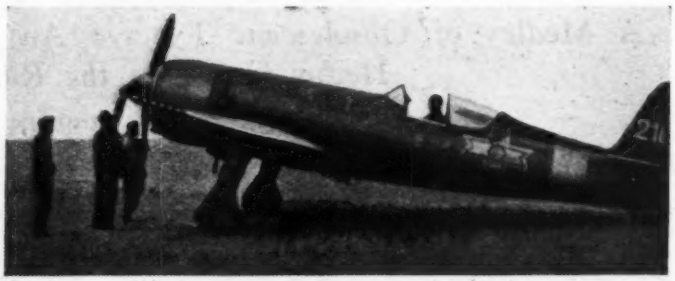
The local aircraft industry is still very modest, with only three firms engaged in the production of aircraft and engines. The most important is the *Industria Aeronautica Romana*, founded in 1925 as a limited liability company and taken over by the state in 1938. With a head office in Bucharest and works at Brasov, the company is engaged in the production of I.A.R. 80 fighters and twin-engined light bombers. The aircraft engines built at Brastov include the two main radial types, the I.A.R. K-9, a supercharged air-cooled engine of 585 h.p., and the I.A.R. K-14, a 14-cylinder twin-radial type of 940 h.p., both developments of Gnome-Rhône designs. The production of the two other firms, the "S.E.T." and the "Içar," both of Bucharest, is restricted to aircraft built under licence to foreign designs and some original developments.

The capacity of this industry is estimated at no more than about 350 aircraft per annum. And since foreign purchases are now impossible and "scrounging" opportunities are as good as gone, the Rumanians have to rely to an increasing degree on their own resources. For while the Nazis use Rumanian crews for operations on the Russian front, they are not so keen to part with equipment, and only a small number of Messerschmitt fighters have been handed over to the Rumanian Air Force. It is quite likely, however, that Polish aircraft factories which are reported to have been reconstructed by the Germans, build some of the latest Polish types for the Rumanians.

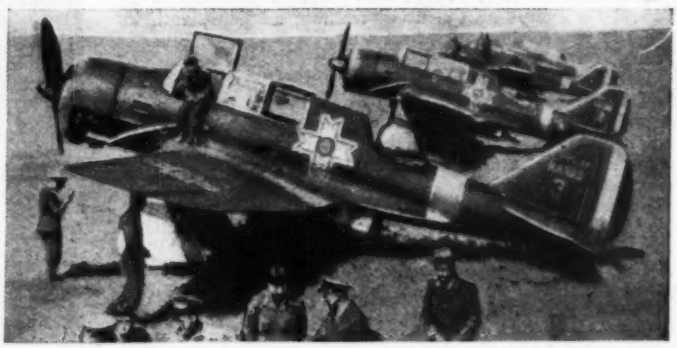
As said before, the flying equipment of the Rumanian Air Force represents a medley of types of different nationality and origin. The fighter units—which form the most important part of the Air Force—are equipped with I.A.R. 80s of original design, the construction of which started at the end of 1939. The I.A.R. 80 is a single seated, all-metal monoplane with a retractable undercarriage and a loaded weight of 5,040 lb. Powered with a I.A.R. K-14 of 940 h.p. twin radial, the fighter develops 317 m.p.h. at 13,120ft., and is armed with four 7.9 mm. M.G.s in the wings, firing outside the airscrew disc, and two 20 mm. cannon and carries a number of 220 lb. bombs.

General Ionescu, the Rumanian Under-Secretary of State for Air.

Recently the I.A.R. 81, carrying also been developed as a fighter-bomber and designated I.A.R.-81, carrying one 440 lb. bomb in the fuselage and two bombs of 110 lb. each underneath the wings. But while the former type is in serial production, only a few of the fighter-bomber version are in existence.



HOME MADE: The I.A.R. 80 single-seater fighter, powered with an I.A.R. K-14 engine of 940 h.p. at 2,350 r.p.m. develops 317 m.p.h. at 13,000ft. and is armed with four M.Gs. and two 20mm. cannon.



FOR CO-OPERATION: P.Z.L. "Karas," powered with Polish-built Pegasus engine of 720 h.p., has a maximum speed of 210 m.p.h., a bomb load of 1,500 lb. and is armed with three M.Gs.

Other fighter aircraft in service include such well-known types as the Me 109-E, the Heinkel He 112-A, the Hawker Hurricane, and the P.Z.L. 24—the latter of Polish construction and armed with two 20 mm. cannon and two machine guns in the wings, and used mainly in the fighter training centre.

Bomber Types

The bomber equipment comprises a number of imported Potez 63-B2 and Savoia-Marchetti S.79B types, built under licence in Rumania. The latter differs from the Italian version by the installation of two Junkers Jumo 211F 1,100 h.p. in-line engines, the mounting of a flexible nose-gun, a different shaped dorsal gun position, the absence of the gun position in the rear section of the fuselage, and in the tapering of the fuselage and the wings.

In the heavy bomber class, Rumania has not produced a single type. The equipment of the bomber unit is, in fact, entirely out of date, composed of original Savoia-Marchetti S.79Bs imported in 1940 from Italy, and used on the Russian front for transport work; 36 Blenheims Mk. I; Heinkel He 111 H6H torpedo bombers, and land versions, and the Polish P.Z.L. "Los" with which two squadrons are reported to be equipped.

Finally, three types are employed for army co-operation and reconnaissance work: the Fieseler Storch, the Rumanian I.A.R. 39 and the Polish P.Z.L. "*Karas*." The I.A.R. 39, the serial construction of which started in 1939 and which is available in relatively large numbers, is a biplane of mixed construction powered with a radial I.A.R. K-9 engine and developing a cruising speed of 170

m.p.h. With a range of about 620 miles, the aircraft carries a bomb load of 1,520 lb. To round off the picture it should be mentioned that the seaplane equipment is composed of a number of imported Cant Z. 501 and Heinkel He 114 types.

The standard of equipment described is obviously mediocre and hardly compares in quality and performance with aircraft types used by other air forces. In addition to this weakness, the limitations of the local aircraft industry deprive the Rumanian Air Force of any substantial striking power, and the average standard of technical and operational skill is low.

The Rumanian squadrons which appeared in the skies of Russia have been so severely cut up by the Soviet Air Force that to-day their main operations are reduced to scouting and protection of strategic points in the rear. In these operations the Rumanians have lost at least 350 to 400 aircraft—a staggering figure if one remembers the total operational strength of their Air Force, the extremely limited training facilities available, and the output capacity of their industry. A recovery from this blow is indeed doubtful, and in future this satellite force of the *Luftwaffe* is likely to be of even lesser service to the German war machine.

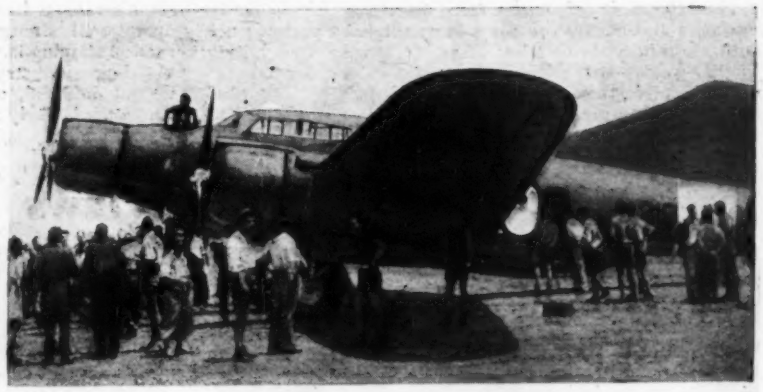
NEWS IN VIEWS

(Above) The new flak jackets worn by aircrews of the U.S. Army Air Force. They are of light, but tough, armour and should give added protection from small splinters and "splash." (Right) Mr. T. O. M. Sopwith presenting a model of a Lancaster to Wing Cdr. Gibson. V.C., on the occasion of a party given in London to the "dam busters."

Ground crews servicing Hurricane IID tank busters. The 40mm. cannon under the wings are interchangeable with long-range fuel tanks or 250lb. bombs.

Behind the Lines

Service and Industrial News from the Inside of Axis and Enemy-occupied Countries



THE CANT Z.1008, a development of the Cant Z.1007 bis "Alcione," has a span of 81ft. 4in. and a length of 60ft. 6in. Constructed in wood, the aircraft has a loaded weight of 30,000lb. and with three Piaggio PXI RC.40 radial engines develops a maximum speed of 265 m.p.h. at 13,000ft.

Appointed

MAJ. GEN. PAUL ADRIAN GASTIN has been appointed by the Vichy Government as Secretary-General for Air Defence.

Balkan Precautions

NEUTRAL sources report that German military authorities have enforced rigorous precautions along the railway lines leading to Salonika. A strict black-out has been ordered in Salonika and Athens.

Bulgarian Gliding

THE activities of German gliding instructors in Bulgaria were reported previously on this page. It is now learnt that a group of Bulgarian glider pilots has left recently for Germany to complete their training in German establishments.

The Storch

FIESELER Storch aircraft are reported to be employed in the Ukraine to help with the cultivation work of large areas in the occupied Southern Ukraine. In using this aircraft it is said that German district agricultural officers can effectively control the work and keep it under constant inspection.

Daimler-Benz Changes

THE general meeting of shareholders of the Daimler-Benz Company on June 8th declared a dividend of 6 per cent. for the current year. Simultaneously, it has been announced that Dr. Alfred Busch, of Berlin, and Otto Fischer, of Stuttgart, have been replaced as members of the board by Karl Blessing, member of the board of the *Continentale Oel A.G.*, and Dr. Otto Fahl, of the Werner and Pfleiderer Co., Stuttgart-Feuerbach.

Catch Them Young

IN order to secure cadres of skilled workers, the Junkers works are now recruiting in Belgium young boys between 14 and 17. The boys are first drafted into the technical school attached to the factory, and after a period of two years of training have to spend one year in the works. Parents have to provide shoes and linen only, the rest, including Nazi youth uniforms, are supplied by the firm. The pay for first year of trainees is 5 RM per month, increasing to 7 RM in the second year.

Export

ON June 17th the Spanish 4th Blue Squadron, composed of fifteen Air Force officers and other ranks, left Madrid for Germany. Their destination is the Russian front, where they are to relieve the 3rd Blue Squadron of Spanish airmen collaborating with the *Luftwaffe*.

Jap Collection

TERMINATING a drive for public donations for an aircraft fund, a name-giving ceremony was held on June 17th at Tokyo, when 17 fighter aircraft and 12 barrage balloons were presented to the army authorities. A similar ceremony also took place on the occasion of a presentation of aircraft purchased from a public collection to the Naval Air Force.

Italy Mobilised

IT is reported from Rome that a total of 8,000,000 to 9,000,000 people are likely to be affected by the institution of compulsory war service for all men between 18 and 36 who are not in the armed forces or already engaged on some kind of war work. This also applies to all women between the ages of 18 and 24 not yet employed in war industries.

Expansion

A FURTHER illustration of the German policy to develop production in the strategic rear is provided by a report from Poland. It is announced that a new company has been established in Krakov under the name of *Krakauer Gummiwerke A.G.* According to the entry in the commercial register, the object of the company is to manufacture different products from rubber, plastics and similar materials.

In Posen the local branch of the well-known German company, C. H. Knorr, reports a tenfold increase of its capital, an indication of the extension of the company's activities.

Raids and Morale

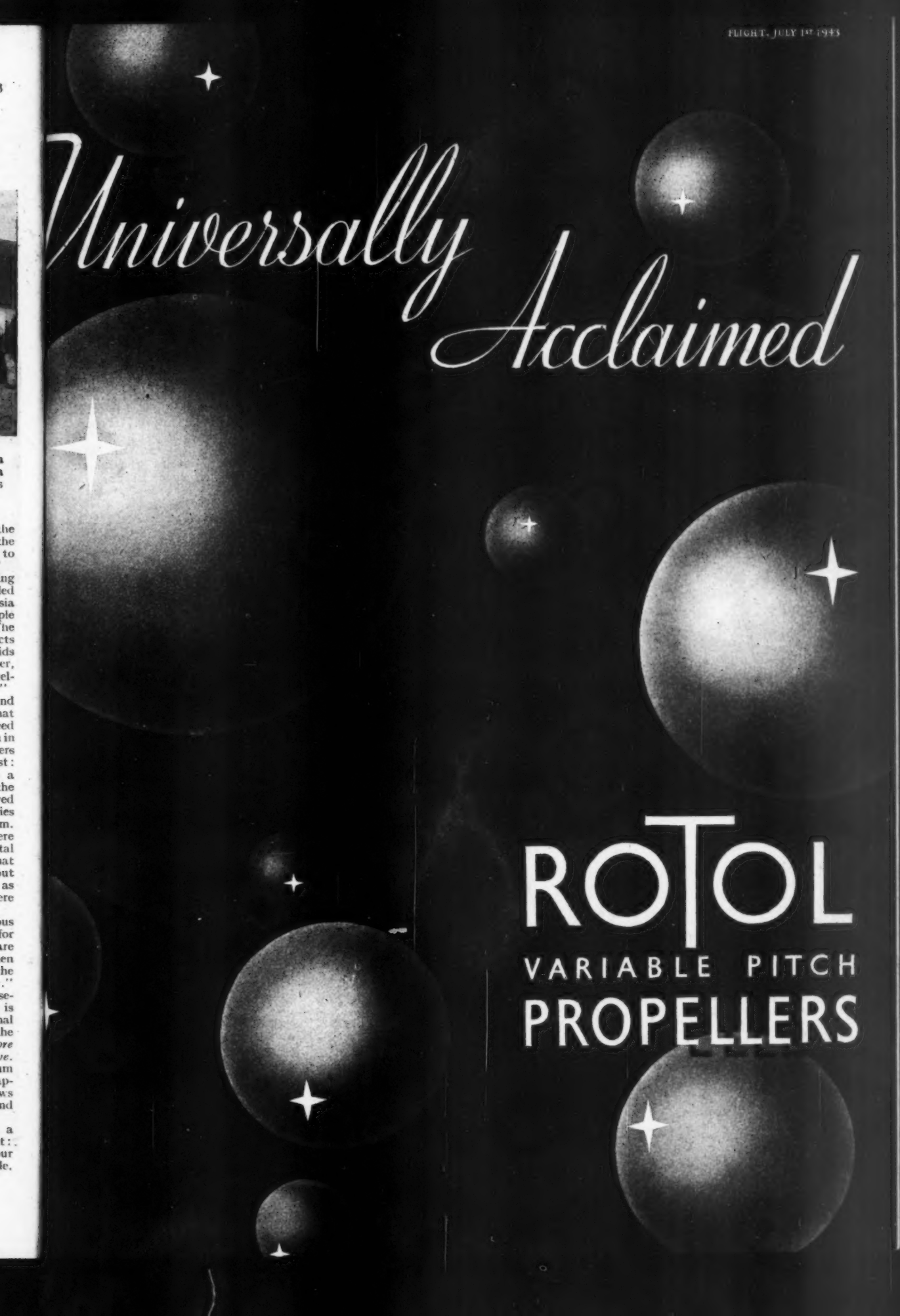
THE effect of R.A.F. attacks on German morale can best be gauged by utterances in the German Press. Increased emphasis is now placed by the German newspapers on the preservation of morale, and people are constantly admonished to keep their chins up. A Ruhr paper writes: "Our own troubles must not make us faint-hearted. This war will be won by those who have the greater power of resistance, both at the front and at home. We do not want to experience another November, 1918."

At the same time, there is increasing evidence that the air attacks, coupled with German experiences in Russia and Africa, are beginning to make people think, doubt and ask questions. "The attitude of the population of the districts which bear the main burden of air raids is most exemplary," says a paper, "but that of a certain clique of intellectuals is, to put it mildly, doubtful."

Rumours and criticisms increase, and one of the popular complaints is that special rations for Party leaders exceed seven times the normal ration. The man in the street, who was assured by his leaders of his immunity, begins to distrust: "They (the intellectuals)—complains a writer—claimed that 10 per cent. of the armament industry had been destroyed in a raid on Dortmund. This also applies to the catastrophe of the Moehne dam. Twenty and even forty thousand were mentioned as the number of fatal casualties. It is a deplorable fact that 540 people were killed in Dortmund, but we can admit it quite frankly, just as we can admit that twice as many were killed in Wuppertal."

The Germans are getting nervous about future war developments. But for a final reply to their doubts they are referred to the Fuehrer: "How, when and where the curtain will rise on the war this summer we do not know." Says another commentator: "It is senseless to ask such a question, for there is only one person who makes the final decision: The Fuehrer, who bears the responsibility. *The Fuehrer cares more about you than many people believe.* Immediately after the raid on Bochum he telephoned and asked what had happened to the population. That shows how much he thinks about you, and about everybody and everything."

A provincial Nazi leader concludes a party meeting with the lyrical outburst: "Heil, Hitler—thou Saviour in our Need; we follow you faithful in battle, until to death we bleed."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Aircraft Types and

SAVOIA MARCHETTI S.M.82 (CANGURU)

THE biggest of Italy's three-engined aircraft, and famous for its four-day flight from Rome to Tokyo last summer, the Savoia Marchetti S.M.82 (Canguru), is a development of the S.M.75, Marsupiale, and is used as a long-range bomber-transport.

It first gained prominence just before the outbreak of war when it set up a world's distance record by covering 8,037.9 miles in a closed circuit at an average speed of 143 m.p.h., remaining in the air for 56½ hours. During the war it has transported troops, fuel, supplies, and even dismantled single-seater fighters, mostly Fiat C.R.42s, and for the easier handling of heavy freight the deep fuselage is provided with block and tackle carried on an overhead runway extending the length of the cargo compartment. Some 600 gallons of fuel may be carried or, alternatively, there is accommodation for 40 fully equipped troops.

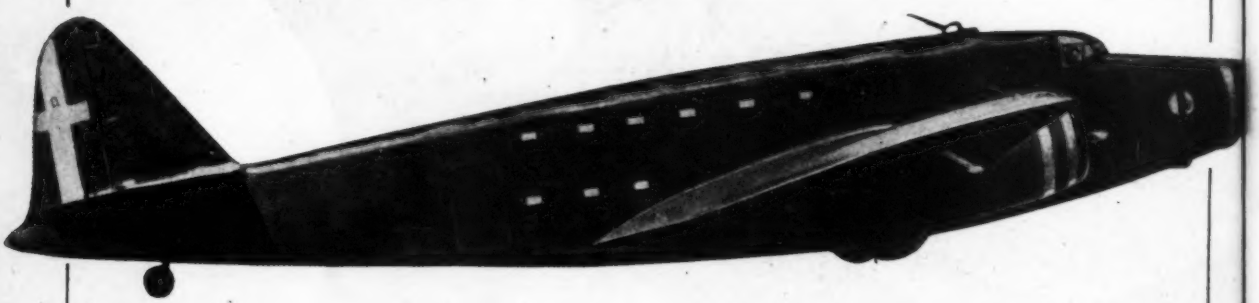
When used as a heavy bomber a hydraulically operated retractable gun-turret is fitted to the top of the fuselage just behind the pilot's cabin, and in addition, no doubt, machine guns could be mounted to fire through some of the small rectangular "porthole" windows which lie each side of the fuselage as far back as the large entrance door.

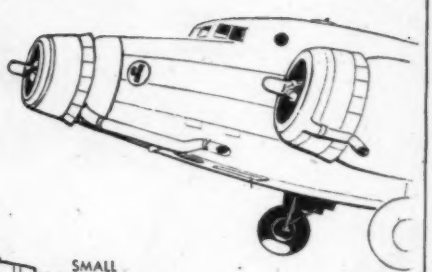
Constructionally, the S.M.82 is a low-wing type, but the bottom of the fuselage does project slightly below the centre-section of the wings. The roots are extremely thick, also, and these two factors give it, from certain angles at any rate, some resemblance to a low mid-wing arrangement.

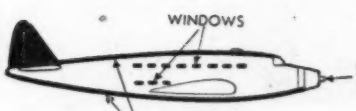
The fuselage, which is deeper than that of the S.M.75, is a welded steel tube structure with fabric covering, but the wings are of wood; this follows standard Savoia Marchetti practice.

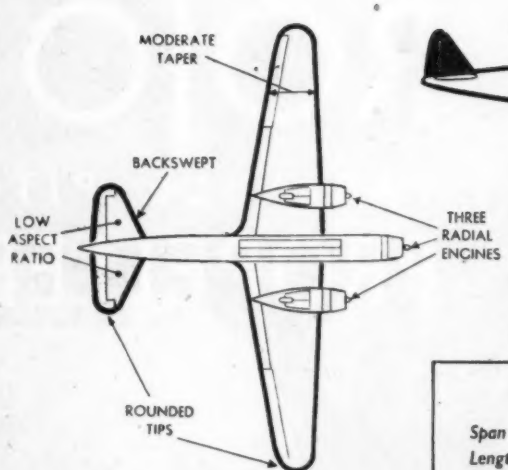
Powered by three 950 h.p. Alfa-Romeo 128 R.C.21 nine-cylinder air-cooled radial engines, the Canguru has a top speed of 230 m.p.h. at 8,200ft., a service ceiling of 20,000ft., and a range of 2,480 miles cruising at 200 m.p.h. Its loaded weight is 38,000 lb., and weight empty 22,000 lb.

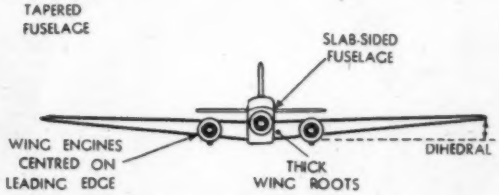
A point for spotters to note is that the tail unit differs from the typical Savoia Marchetti pattern, the fin and rudder being well tapered and of higher aspect-ratio, while the tailplane's leading edge is backswept.











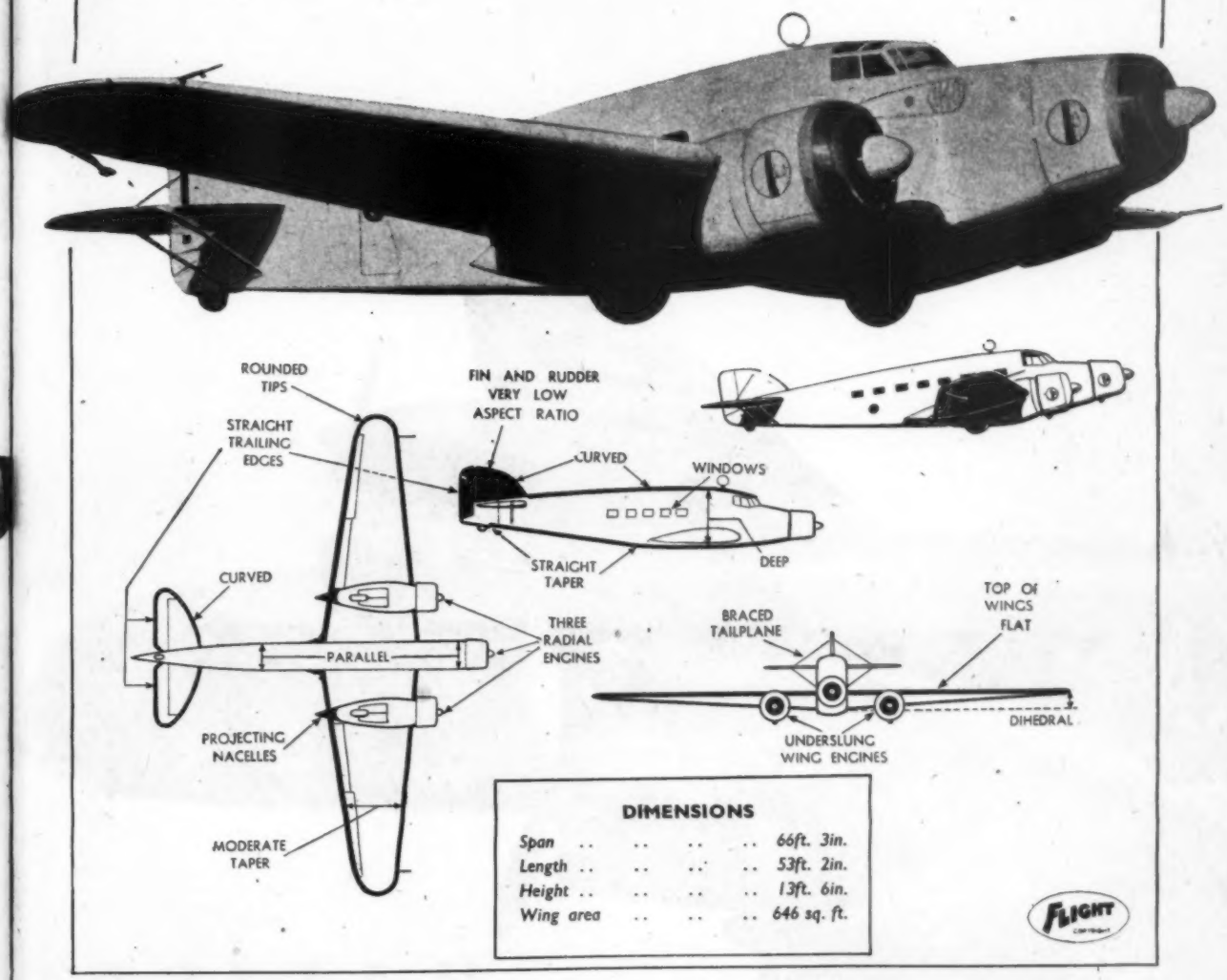
DIMENSIONS

Span	*97ft. 5in.*
Length	*74ft. 0in.*
Height	*18ft. 0in.*
Wing area	*1,276 sq. ft.*

FLIGHT COPYRIGHT

dheir Characteristics

SAVOIA MARCHETTI S.M.83



VERY much smaller than the Canguru, the S.M.83 was developed by Italy for the South Atlantic service between Rome and Rio de Janeiro, and is one of the fastest multi-engined transport aircraft in existence, having a top speed with full load of 276 m.p.h. at 13,120ft.

Eleven of these aircraft opened the South Atlantic service in December, 1939, and continued to operate it until Brazil, fully appreciating the nature of the unadvertised pro-Axis activities it facilitated, put a stop to it early last year and "froze" six of the eleven aircraft which happened, unfortunately for Benito, to be at the Rio de Janeiro end of the link at that moment. These six S.M.83s were later bought by the U.S. Defense Supplies Corporation, were overhauled by Pan-American-Grace Airways at Lima, and were subsequently flown to the U.S.A., where they were destined for the anti-Axis duties of army transport work.

Constructional methods follow accepted Savoia Marchetti principles, the fuselage being a welded steel framework with fabric covering, and the wings of wood with plywood covering over which is laid a fabric skin. Because of their oversea duties, the wings are divided by their internal structure into a number of watertight compartments which would give a reasonable degree of flotation should such a quality ever be necessary, but, thanks to the reliability of the 750 h.p. Alfa-Romeo engines, during the two years they operated over the South Atlantic this virtue was never put to the test so far as is known. In all, 211 successful ocean crossings were made, involving a total distance of 1,600,000 miles. Altogether 424 passengers, 129 tons of freight, and some 70 tons of mail were carried between Rome and Rio de Janeiro.

Unlike the big Canguru, the S.M.83 has a typically Savoia Marchetti tail unit, its fin and rudder being of very low aspect ratio, with a curved leading-edge and a straight vertical trailing-edge, and the tailplane almost semicircular with a straight trailing-edge; double parallel struts brace the tailplane to the lower longerons of the fuselage and single struts brace the fin to the tailplane.

Cruising speed is 248 m.p.h. at 16,400ft., service ceiling 27,600ft., and cruising range about 2,500.

"FEATHERED FLIGHT"

HALIFA

De Havilland Technical Training

Education Board Set Up : Apprenticeship Scheme and Adult Classes

WITH growing realisation of the fundamental part which technical education must play in post-war industry, the directors of the De Havilland Aircraft Co., Ltd., have decided to establish an Education Board.

Twelve of the senior executives of the aircraft, engine and airscrew divisions of the company have been selected to form this new body, the function of which will be to guide the technical activities of the whole D.H. organisation.

These are, of course, centred on the de Havilland Aeronautical Technical School, inaugurated in 1928, and embrace a comprehensive apprenticeship scheme with scholarships.

Adult trainee classes are another feature and one which is likely to be further developed, for wartime experience has demonstrated the value of giving instruction courses to people joining almost any department of the company. The D.H. library, discussion societies and all other activities affecting technical and general education will come within the board's responsibility.

The new board in session. Mr. F. T. Hearle, managing director, is at the top of the table. The other members of the board, seated from left to right, are : Messrs. C. C. Taylor; H. J. Nixon; W. U. Snell; W. E. Nixon; J. M. F. Maslin; J. L. Brodie; A. J. Brant; T. C. L. Westbrook. Messrs. R. M. Clarkson, P. E. Gordon-Marshall, and R. E. Bishop, who do not appear in the photograph, are also members of the new board.

Many hundreds of young men have graduated through the D.H. "Tech. School" in the past 15 years, and although the de Havilland companies in Britain and the Empire have absorbed large numbers of them, it has always been recognised that the student must be fitted for a career in the industry as a whole. Indeed, the broadening effect of an interchange of trained engineers between aircraft builders—and increasingly so between Britain and America—has long been emphasised.

Associate Fellowship of the Royal Aeronautical Society and Graduateship of the Institute of Production Engineers are the principal diplomas on the design and manufacturing sides, and Air Ministry licences on the operating and maintenance sides. The courses are arranged in collaboration with the Board of Education and local authorities, and keyed to the National and Higher National Certificates. Apprentices can, by scholarship, pass to the highest stages in any branch, provided they show the requisite aptitude and industry.

In war conditions training needs have expanded and become complex. The post-war period will impose greater educational responsibilities, for which planning is already under way. The task of ensuring, by organisation, that all people entering the company (and not only students and apprentices) are given the opportunity to make the best of their talent and aptitude is complicated by their entry in different capacities, at different ages, and with different educational backgrounds. General and cultural education are as necessary as technical training —a point which is wrapped up with the question of raising the minimum school-leaving age.

The organisation must effect its filtration process with sensitive flexibility, and in two distinct ways: first in sorting the entrants so as to give training to each in the subjects he lacks, and secondly in assessing the pupils individually during the educational process so as to direct their ability into the most suitable career channels.

De Havilland's interests in the separate fields of aircraft, engine and airscrew design and production, components and accessories, light-alloy forging and engineering, aircraft operation and maintenance, and flying training, afford a valuable breadth of instructional amenities.

TECHNICAL TRAINING

LAST Friday an excellently attended meeting held by the Royal Aeronautical Society provided further evidence that the aeronautical world is very much alive to the necessity of post-war reorganisation of technical training so often urged in *Flight* and its associate journal *Aircraft Production*.

The chairman, Dr. Roxbee Cox, in his opening remarks called for a wider scientific training of aeronautical technicians, and pointed out the importance of post-graduate study. He also touched upon the subject of ensuring reasonable prospects of reward if the aircraft industry and science is to continue to attract the keenest and most intelligent young men and women of this country.

Sir Roy Fedden gave a most instructive review of American achievements in this field, emphasising that the remarkable expansion of aircraft production has been largely due to the attention paid in pre-war days to the advancement of specialised training. By way of illustration he mentioned that to-day there are in the U.S. 2,000 laboratories employing some 70,000 men, and that during 1942 no fewer than 1,400 American young men and women took aeronautical degrees. While due allowance has to be made for the size of the country and population, Sir Roy emphasised the need to widen existing facilities of training, and suggested the formation of a committee which would discuss the different aspects of the problem and produce a detailed report and press for its realisation.

Prof. Melville Jones dealt with post-graduate study and research, and advocated the creation of a central post-graduate school. He wanted to see a rise of general standards of technical and scientific knowledge, not only among those directly engaged on aircraft work, but also among those in whose hands lie the direction of the nation's affairs.

Sir Frederick Handley Page advocated the inclusion of the study of production problems in the syllabus of post-graduate courses. He pointed out that this field of knowledge covering the study of engineering methods, new materials, administration of labour, planning, and economy is one of major importance to the future development of the British aircraft industry and civil aviation.

Other speakers, among them Mr. F. G. Miles, Mr. W. E. W. Petter, and the Principal of the University of Hull, were unanimous in their views as to the need of reorganisation of post-war aeronautical training. So keen was the discussion, which lasted for over two hours, that the chairman announced that another meeting would be arranged, at which he hoped a crystallised idea of a broad plan will emerge.

Gas Turbines and Jet Propulsion for Aircraft

By G. GEOFFREY SMITH, M.B.E.

A second edition of the above booklet is now available from "Flight" publishing offices. The new work consists of ten chapters and includes many illustrations. Price 3/6 plus 3d. post.

Topics of the Day

Comparisons and Compositions

Is the Modern Aircraft Any More Difficult to Fly Than Its Predecessors? : Comparative Training Effects : Wanted—A New Literature of the Air

DISCUSSIONS between two generations are usually interesting so long as the remarks don't become acrimonious or merely suitable for insertion in the "line book." So long, in fact, as the participants are not the sort of people who listen only to their own voices and treat other conversation merely as an unfortunate sandwich between their own inimitable remarks, witticisms and stories. There *are* people—you have only to watch their eyes to know—who never by any chance listen to what the other fellow is saying, but wait patiently for their own turn.

To listen to a conversation between, say, the pilot of a Typhoon and one of a Camel is the most entertaining entertainment in the world, so long as the young man doesn't suffer from a swollen head and the old man is still young in mind and receptive of new ideas. The youngster, of course, is sure that the modern machine is more difficult to manage and requires more training, more concentration, and more mechanical knowledge—and he is horrified at the idea of flying, let alone going to war, without a parachute. The veteran feels that in his days aircraft were aircraft and not mere masses of mechanism—and he didn't miss a parachute because it just hadn't occurred to him that such a device could be used.

There is no end to the discussion, since there is no common ground on which the two can tread. Even in my comparatively short experience of flying machines I find it impossible to judge the relative difficulty of various types, once one has become accustomed to each. Quite obviously one's first aircraft is an extremely difficult affair, and, in a different way, one's first experiences with the "modern" type are equally harrassing. Such items cannot fairly be included in the balance sheet.

In the same way, if a pilot returns to a light aircraft after hundreds of hours on heavy modern devices, he usually finds that the "advanced" type of light aircraft is a good deal more easily managed than one of the basic kind. I find a Magister, for instance, much less troublesome than a Tiger Moth, but such a comparison is more than odious; other pilots may not agree and certainly the *ab initio* pilot will not necessarily find it to be true. The reasons for my preference are hard to define, but the most obvious ones—such as low-wing view, steep approach, and more "automatic" landing characteristics—are merely the obvious effect of recent experience. Furthermore, an easy flying machine is not necessarily the best one on which to learn.

Moderns are Easier

But when one comes to compare operational types which have been used since the beginning of the war, and on which one may have flown a more or less even number of hours, the comparison is still just as difficult. It is the most enormous tribute to designers to say that, on the average, the operational aircraft of 1943 is no more difficult than the same type of 1940. It requires more room on which to take-off and to land—and such room has been provided—but it is just as viceless, and the only difficulty worth discussing is concerned with the increase in necessary "drill," particularly in the larger examples. But this drill is counter-balanced by the fact that we have become accustomed to drill, as such, and that it is, relatively, no more tiring now to deal with the taps on a Fortress or Lancaster than it was, in the old days, to remember the nonsense on a Blenheim or a Battle.

So far, performance seems to have cost us practically nothing but plain cash—more expensive airframes, more expensive engines and more expensive airfields—and cash doesn't matter a very great deal at the best of times. and certainly not in the middle of a war. In general I should say that aircraft are a little easier to fly than they were, though count must be taken of the cumulative experience, whether actual or passed on by instructors, of the pilots. Easy as the Mosquito, for instance, seems to the 1943 newcomer or the experienced pilot, I doubt even if the best of pilots in 1933 could have coped more than haphazardly with it. And I'm forgetting the drill.

He'd have got it down, but he would have been puzzled by the landing characteristics into a succession of minor "balloons"; by the quietness and calm of the approach into an excessive gliding speed and consequent overshoot; by the noise and acceleration during take-off into a series of over-corrections with the rudder; and by the lightness of the controls, perhaps into some structure-destroying aerobatics. Though it is safe enough to put the two-hundred-hour pilot of 1943 in charge of a Typhoon, Beaufighter or Mosquito, it most certainly would not have been safe to put a pilot of similar experience on these machines in 1933. The new boys have been worked up quickly but scientifically to this stage of comparative skill. But, as I've said before, given the effect of later knowledge and later ideas, aircraft are easier to fly than they ever have been.

Writing About It

Incidentally, it is time someone really tried to produce a literature of flying as it really is. None of this business of riding the clouds, strength through joy, beneath the empyreum, of throbbing power and outstretched wings over a carpet of cotton-wool; of the man-eagle, the piercing blue eyes, the quick, icy decisions; of riding alone with death; and of wings over the world. That nonsense is all very well as propaganda for the very young—in mind if not in body—and, as such, has served its purpose. Now that flying, with bombs and sudden death as well as with important passengers, is almost a commonplace, it is time that someone wrote feelingly about it before it actually becomes a commonplace; it may then be too late.

Oh, I know that people have written good books about the world of the flying man. White's "England Have My Bones" was one of the better books describing that world as far as it concerned the man in the flying club; Lewis's "Saggitarius Rising" is one of the very best pieces of literature about the 1915-1925 flying man; and Hillary's "Last Enemy" is almost a classic as a record of the ideas and background of the young man who fought the Battle of Britain for us. But all these are books about people and people's reactions rather than about the machinery they control. The time has come for someone to write about aircraft as Forester writes, for instance, about ships; to write about the flying man's feelings in the Joyce or Hemingway manner, with none of the "air-mindedness" manner thrown in; and to waive the melodrama which still, somehow, clings to the prosaic but intensely interesting business of aeronautics in the modern manner.

Listen to this: ". . . There was an even chance of her being pooped—Hubbard could tell, by the feel of the deck under his feet, how each of these grey mountains in its turn blanketed the close-reefed topsails, and robbed the ship of a trifle of her way. He could tell, too, by the way the quartermasters had to saw back and forth at the wheel to meet the *Delaware's* unhappy falling off as each wave passed under the counter. If she once broached-to then good-bye to the *Delaware* . . ." That sort of thing is sheer joy to the reader who has any sort of passion for, and understanding of sailing ships, but it is an almost equal joy to the reader who doesn't understand

COMPARISONS AND COMPOSITIONS

a word of it, but feels one with the author. Again: ". . . Peabody watched warily as the mizzen topsail was sheeted home. The *Delaware* reacted to the added pressure instantly. There was nothing light or graceful about her movements now. She was crashing from wave to wave like a rock down a hillside. Even with the wind well abaft the beam as it was she was leaning over to it, the white foam creaming along her lee side to join her boiling wake. . . ." That was Forester, and not even at his very best.

If people can take and like that—because it is not only good description, but technically accurate—they can surely take the real thing when it is applied to vessels which are more modern and equally exciting in their own way. I won't lay myself open to well-deserved criticism by attempting even a sentence or two in any style which might be comparable, but I'm going to produce a few notes covering just as short periods in any normal piece of flying. Clever people may be able to recognise the type of aircraft involved.

The lumpy vibration as the two motors warm up with the pressures high, the temperatures low, and the revolution needles swinging idly between a thousand and thirteen hundred. The thin squeal of the brakes when the trigger is spasmodically pressed as the aircraft takes the curves in the perimeter track; a following wind blows the strangely blue exhaust smoke past the mud-coloured cowlings on either side. A steady green from the chequered cabin beside the runway. Hydraulics; trim zero, zero, and an inch forward; mixture rich; pitch fine; inner tanks; dive-brakes off; gills slightly open. All set. A touch of brake to keep her straight, and the fine smooth sense of accelerating power as the throttles go through the rated gate.

The small sigh of relief and the sense of peace and quiet as the boost and the revolutions are brought back to cruising with the undercarriage snugly up and the A.S.I. showing a clear one-eighty. The kaleidoscopic effect of cloud shadows as they cross the visible wing area; the short, sharp bumps as the outside world is suddenly hidden by a grey-white blanket; and the brilliant colouring of the fields, sky and horizon as we break cloud with the suddenness of an opening camera shutter. A little streak of oil beside the cowling, shiny brown and dancing in little patterns as the gale of speed and slipstream lash it; and the absurd rattle made by a tiny piece of loose fabric fluttering off the centre-section. The sea like a mottled blue-bronze plate—impossible to believe that those mottlings, so utterly stationary like lava lines on a strange new planet, are quite big and far from stationary. The sea, and a job to do.

Twenty-six hundred, rated boost, cannons cocked, trigger on "fire," forward trim, most of the world hidden behind the gun-sight's strange circular design of fiery pink snake, the rate-of-climb needle central but on the wrong side, the altimeter needles going round like the hands of a clock with a broken escapement. More forward trim. Then an uneven hammering as the trigger is touched, and an acrid smell of cordite. It is difficult to see through watering and stinging eyes. The shells can be seen—yes, seen—as they plunge away in the bright sunshine to make fountains of water. The sea is no longer a mottled plate, and the green-blue waves are real and mountainous and white-topped. A feeling of dark heaviness as the nose comes up. The horizon disappears sideways as the gyro spins and the hands of the clock moves more sedately in the reverse direction. . . .

That sort of thing. Well, we're waiting for the chap who can bring these flying machines to life in a book which will be really worth reading. "INDICATOR."

Book Reviews

The Fleet of the Future. By the Marchioness of Londonderry, D.B.E. Hutchinson. 6d. net.

THIS little brochure is described as "an important examination of Major Alexander Seversky's famous *Victory Through Air Power*." It contains numerous quotations from that book, and Lady Londonderry evidently wholeheartedly shares the view of Major Seversky that air power by itself can win this war. It is described as "the paramount and decisive factor in war-making," and there is a lot more to the same effect. We do not agree with the opinions of Major Seversky and Lady Londonderry.

Combined Operations, 1940-1942. H.M. Stationery Office. 1s. net.

PRACTICALLY all the campaigns in which Britain has taken part since September, 1939, have been in a sense combined operations, but the formation and deliberate training of a special force for this purpose and bearing this name is a novelty of this war. This little book tells the history of the various raids made up to and including Dieppe.

Air power must most certainly play a very important part in all such operations, and airborne divisions call for the closest co-operation between the Army and the Air Force. When such divisions are not used the parts which the Air Force must play are, first, complete reconnaissance of the area to be attacked; secondly, observation throughout the daylight hours and constant reports of progress to H.Q.; and, thirdly, the provision of air cover for the troops which have landed.

One of the objects of the Dieppe raid was to bring the *Luftwaffe* to battle on a really extensive scale, as previously air action by itself had failed to do so on a scale which suited our purpose. The Dieppe raid was not altogether satisfactory in achieving every one of its objects, but it certainly produced the great air battle. All day long the R.A.F., directed by Air Vice-Marshal (as he then was) Leigh-Mallory, flew over the Dieppe area, and for part of the time were assisted by American Army Fortresses. The Germans are believed to have lost up to 170 aircraft, whereas our losses were 98.

The air side of the operation is told in less detail than are the military and naval sides, but for every reader this is a book to stir the blood and rouse pride in the spirit of the men of the British Empire.

"The Testing of High Speed Internal Combustion Engines." By Arthur W. Judge, A.R.C.S., A.F.R.Ae.S. Third Edition, revised, and published by Chapman and Hall, Ltd., 11, Henrietta Street, London, W.C.2. Price 42s. net.

FURTHER chapters have been included on Cathode Ray indicators and Testing of High Speed Compression-Ignition engines, whilst sections of the previous edition have been rewritten and expanded in the light of recent development and brought up to date. Dealing with almost every aspect of the subject, and with a marked absence of complicated mathematical formula, this book can be especially recommended to the practical engineer and mechanic.

Bugle Blast. An Anthology from the Services, edited by Jack Aistrop and Reginald Moore. Allen and Unwin. 5s. net.

THIS is a collection of short stories and verses by various writers, all dealing with life in wartime. Some of the writers are known and some promise to be well known in the future. The tales are well told. One very short story, "Morning Victory," by "Flying Officer X," directly concerns the Royal Air Force, and somewhat resembles a glorified handout by the Air Ministry News Service—only it is very much glorified.

Another—"One of the Unlucky Ones"—is attributed to "Aircraftsman B." The letter "s" in the middle of the word makes us doubt the authenticity of the signature. When will the public all learn that this R.A.F. term is not "aircraftsman" but "aircraft-man"? In any case, this not very edifying story has nothing to do with any of the Services, but describes a sordid adventure by an individual who might just as well have been a tinker, tailor, apothecary or thief.

Keeping T

Some of the Activities of a Bomb Station Which Go on for 24 Hours Every Day to Keep Aircraft Serviceab and Direct Them on Their Operatio

1. The flying-control officer in the operations room dictating to his R.T. operator.

2. A corporal teleprinter operator sends a coded message to Group H.Q.

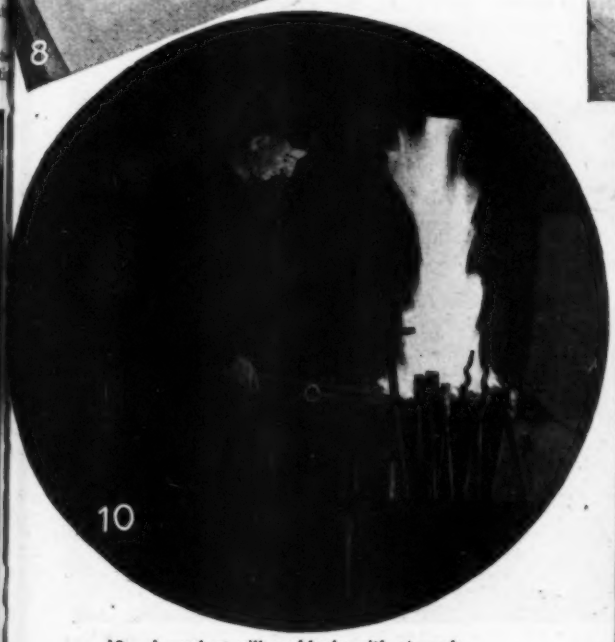
3. Pressing out a ball race in the workshops.
4. Turning up a new part on a workshop lathe.

5. A peep at the W.A.A.F. operators on the station telephone exchange.
6. A radio operator taking down messages from the station's aircraft.
7. Fitters overhauling an engine in one of the hangars. Much of the maintenance is of course done at the dispersal points.

8. Preparing a weat map from the la "met" figures.
9. Sparking plug tes cleaning and adjus plugs.

THE aircrews work both metaphorically and actually in the limelight. Without detracting one whit from this highly deserved praise it must be remembered that bombers fly only by reason of the work put in by devoted ground staff. We show here a series of pictures taken at random during a walk round a bomber station while the aircraft were away on a job of work. For every one picture shown here another twenty could have been taken. Such is the complexity of modern air warfare.

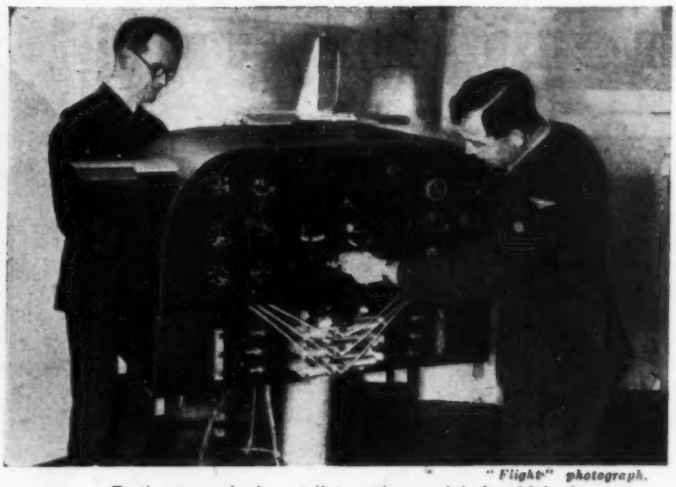
Them Flying



10. A modern village blacksmith at work.
11. A metal worker at the carborundum wheel in the workshop.

Sperry School

Pre-war School Revived Under Technical Training Command : Maintenance of Automatic Pilots and Bomb Sights

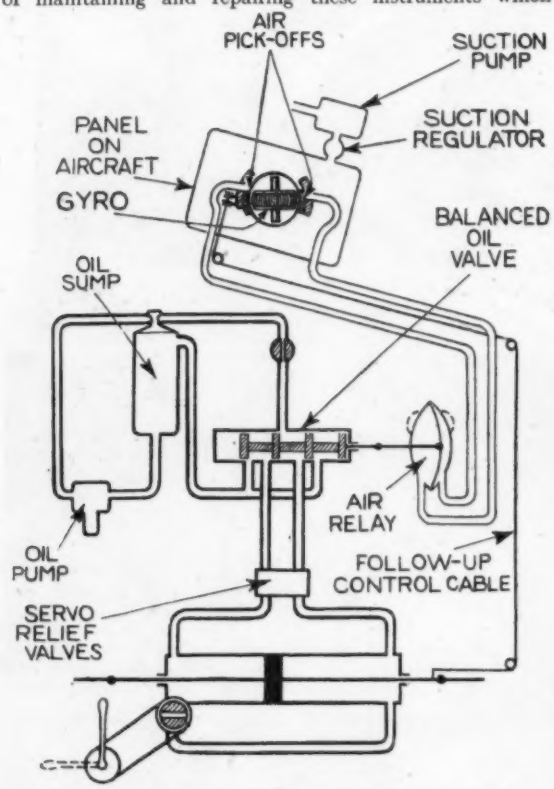


"Flight" photograph.

Testing a repaired gyropilot on the special rig which shows the actual movements on miniature aircraft control surfaces built into the panel.

AT the outbreak of war there were more than 2,500 Sperry gyropilots fitted to commercial, military and private owner's aircraft the world over, and the Sperry company had found it necessary to provide a school where users of their products were able to learn repair and maintenance. When hostilities began, these activities had to give way to production, and all repair work for the time being was handled by a department of the company.

With the vast increase of instruments in service there then came a call for specialised trained personnel capable of maintaining and repairing these instruments which require such delicate handling. This delicate handling must not be confused with lack of robustness, of which there is not a trace, but some of the parts must be adjusted to within 1/10,000 part of an inch. As an example of robustness, overhaul is considered necessary only every 800 hours in the case of the gyropilot.



The Sperry gyropilot shown diagrammatically. The gyro remains undisturbed when the aircraft moves out of its pre-set course. This uncovers one or other of the suction nozzles normally covered by the air pick-off plates. Suction in the pipe moves the diaphragm in the air-relay and this, in turn, actuates the balanced oil-valve. The oil pressure thus released applies force to the piston in the servo cylinders.

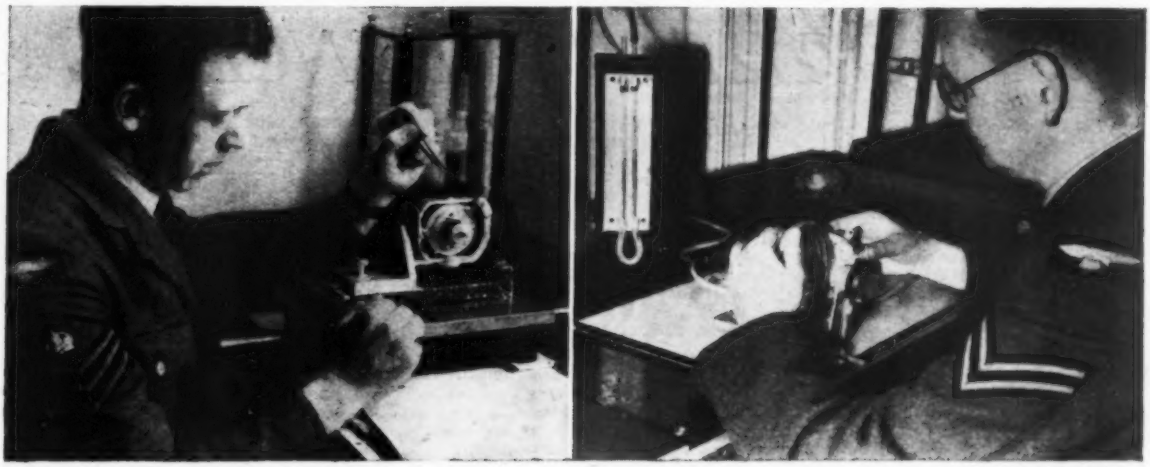
The Technical Training Command of the R.A.F. runs an excellent instrument school of their own, but it is obvious that only a general knowledge of all the instruments used in service aircraft can be imparted in the time available.

Technical Training Command has, however, a manufacturers' courses branch which organises schools jointly run by the service and manufacturers to enable suitable men to get specialised training in the latest types of equipment. Such is the Sperry school, and although a proportion of civilians and U.S. service personnel attend the courses, all applications for entry must be made through Technical Training Command. In the Sperry school at present there are courses for the gyropilot and small instruments, the famous Sperry bomb sight, and others dealing with instruments which are, as yet, under the shroud of military secrecy.

When a pupil arrives on the gyropilot course he is first

"Flight" photograph.

Testing an air pick-off plate for flatness. 1/10,000th. in is the maximum tolerance allowed.



"Flight" photographs.

(Left) Balancing the gyroscope and its gimbal housing. (Right) The clearance between the air pick-off plate and the suction nozzles (which by relay actuate the controls) is so tiny that a feeler gauge cannot be used. Balanced columns of mercury working under the effect of a partial vacuum show minute differences.

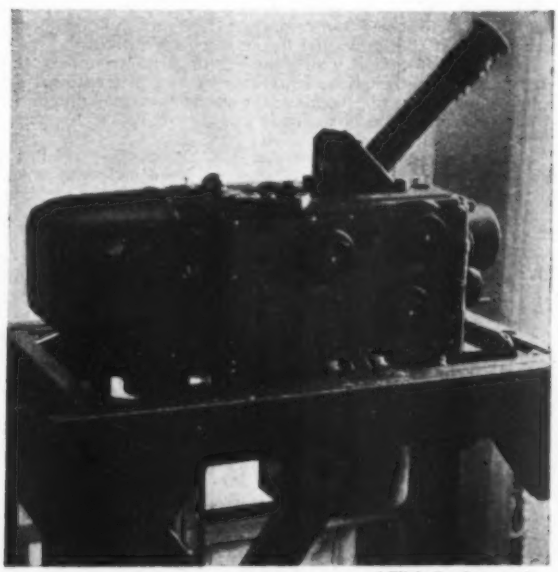
SPERRY SCHOOL

given instruction in the use of simple gyros by the aid of models. The next stage is to handle a complete set-up which has ailerons, rudder and elevator to show the method of operation and the effect of erroneous adjustment or faults. The pupil, it must be remembered, is already a qualified instrument maker or repairer when he arrives, so he is quite capable of handling the next stage which consists of completely dismantling a gyropilot unit. He is then given a number of worn or defective parts to incorporate and has to decide from final test after re-erection which parts are defective and the nature of their defect.

If he were maintaining an instrument at a service station he would, of course, draw new parts from store. At the school, however, he is required to make new the parts

"Flight" photograph.

Pandora's box. Sgt. Brandreth explains the interior workings of a Sperry O-1 bomb sight to a civilian pupil from the Sperry maintenance organisation.



"Flight" photograph.

The famous Sperry O-1 bomb sight which legend has it will put a 1,000 lb. bomb in a sauce bottle from 20,000ft.

himself in order that he may fully appreciate what these small tolerances mean. The new parts having been made and the instrument finally erected, it is again put on to the test rig. To gain the pupil full marks it must be perfect in every respect, but at least 70 per cent. marks must be obtained before a certificate of proficiency is given. The number of failures to qualify is very small because any pupil who appears unlikely to make the grade is eliminated in the early part of the course.

There is, in the classrooms, every piece of necessary equipment for doing very fine work. Toolmakers' and watchmakers' lathes, face plates, hypodermic syringes for controlled oiling and measuring gauges reading in 1/20,000th of an inch. Each bench has, of course, a glass cabinet wherein dismantled parts can be kept free of dust particles. The organisation and administration of the school are under the care of Mr. D. McNaught, A.M.I.E.E., who is assisted by Sgt. Brandreth, R.A.F., and Mr. A. E Haslehurst.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

AN AERIAL COMBAT SOCIETY

Amendment Suggested to Widen Scope

WITH reference to the suggestion of R. Barclay Shaw in your issue of June 3rd, may I amend this slightly by proposing that an association be formed (say, on a county organisation basis at first) whose members are all men who are serving or have served as air crew, whether in the R.F.C., R.N.A.S. or R.A.F. The scope of such a society will be obvious to anyone.

If interested persons living in the south of England would write to you, and you would be kind enough to send such correspondence to me, I should be pleased to play a small part in starting the machinery.

"CAPTAIN" (formerly Infantry, R.F.C. and R.A.F.)

INTERNATIONAL AIR POLICE

Democratic Limitations of Freedom

"GROUP CAPTAIN" in his letter published on June 17th, 1943, fails to appreciate that any limitation of freedom should be determined by democracy and not by law being imposed upon the individual by an external authority.

If "the vast majority of people" in Britain support the view of a leading American statesman that an international air police force should be combined with other armed forces to enforce peace, I should imagine it would be indicated by something more than signs.

Is your correspondent without the knowledge, which he credits to me as vision, that stupendous power is in the hands of those who control the issue of money, and that the creation of an international tribunal would inevitably fall to the money-power whose objective is the final establishment of an international police state? "GYPSY."

ADVANCED AIRFIELD SERVICE

Flying Workshops Suggested

THE task of servicing advanced operational airfields is one of considerable importance, and there is no doubt that much can be gained or lost according to the speed at which these landing grounds can service aircraft.

In this respect I think that if one or two fairly large transport aircraft or gliders could be specially fitted out they could be of great help in getting a landing ground ready for operations.

As soon as the ground was ready the aircraft could land, and they would be available, almost immediately, for servicing duties.

All spare parts likely to be required could be carried besides a generator, lathes, tools, jacks, etc.

The Americans had a ten-ton lorry fitted out for this purpose, but the speed of such a vehicle would be no more than that of the main supplies coming up behind.

Aircraft, on the other hand, could travel as quickly as the advanced forces and could deal effectively with emergency work until the main ground forces caught up.

"HORSA."

SCIENTISTS AND THE COMMUNITY

Exaggerations That Lead to Disappointment

MOST scientists find themselves in agreement with the pleas which are now being made that the scientific effort, so effective in the war, shall not be allowed to cease when peace returns, but shall be applied to the serious problems which will arise during reconstruction, and after. It is certain that if, in this small island with its limited material resources, we are to maintain our existing population with its present standard of living, scientific and technological research will be required on a scale not yet envisaged.

Many responsible scientists, however, view with concern exaggerations which often accompany reasonable claims. From time to time, statements are made by individuals or by organisations, professing to speak for science, that if some fraction of the national income were allocated to scientific research, and if men of science were given a position of authority in the affairs of the State, the community would find itself in what is usually described as "an age of plenty."

It is unfortunate that such exaggerations should be disseminated when schemes for future reorganisation are being discussed. To mislead the community as to its available resources can only foster illusions and bring disappointments which may be disastrous both for it and for science. While we may hope that the improvement in our material comforts, which has marked the past 50 years, will be continued by further applications of scientific methods, the fruits of research sometimes ripen slowly and our material resources during the post-war period cannot be vastly greater than those we now possess. Because of the time-lag in the application of research, it is important that immediate preparation be made for reconstruction.

The claim that the scientist, as scientist, is entitled to some position of exceptional authority in deciding the policies of governments is one which cannot and should not be accepted in a democratic community. Social problems are too complex to be solved by any one type of mind. The man of science can give valuable assistance in solving problems facing a society by searching out the facts and, on the basis of the facts, suggesting remedies. He could profitably be consulted more frequently than has been the case.

When, however, his advice has been given, his duty *as a scientist* is at an end. No social problem can be solved solely by the methods of science; not only material but other values are involved, and it is for the community, of which the scientist is a member, to weigh the different factors and make a decision. A scientific and soulless technocracy would be the worst form of despotism.

ROBERT H. PICKARD (Chairman, Joint Council of Professional Scientists);
ALEXANDER FINDLAY (President, The Royal Institute of Chemistry);
W. L. BRAGG (President, The Institute of Physics).

FEAR

Aspects Only Flying Reveals

MAY I, through the medium of your Correspondence columns, refer to the recently discussed subject of fear. I think that flying brings into clear relief various aspects of fear, which are not revealed by any other activity. From a pilot's point of view I think that fear can be regarded as either present, i.e., real and impending danger, or abstract, that is, a fear arising out of the contemplation of future disaster, or consideration of risks taken, when considered in retrospect. Both will produce physical expressions of fear, i.e., sweating palms and feet, quickening pulse, and so on. Thus a test pilot may, if his sensitivity and "fear reaction" is high, on estimating the degree of risk of failure in the air, come to a fair estimation in his own mind, without any logical or factual evidence for his conclusions.

This "abstract fear" is quite independent of the form fear will take in the same individual in the presence of crisis. The individual who will analyse fear on the ground (that is, recognise his own apprehensions and be guided by them) is more likely to have the moral conviction of his own conclusions. Furthermore, it is my opinion that this sort of individual is more likely to retain control of himself in dire disaster than the pilot who says to himself and others "a shaky do will shake me, but I (The great I-am) am never really frightened."

Fear is a natural response to risk whether it be a risk to life, property, a friend or a principle. It is fair to say that reaction varies progressively in the above order, in ratio to the degree of civilisation reached, e.g., the fighter pilot nips overboard as he loses lateral control (i.e., fear reaction is 100 per cent. life), and is inclined to do a belly landing if the flaps won't work, i.e., fear of damaging property is nil and also his fear of not being friends with the Engineer Officer, is (in the moment of stress) also nil. I know this to be true because immediately prior to a certain crash I realised that the engineer officer would be very annoyed, but the prospect caused me no emotion whatever, fear or otherwise. At the other end of the scale the passenger aircraft pilot has sublimated his fear to the extent that he does not carry a para-

CORRESPONDENCE

chute, not because he loves his passengers, but because passenger aircraft do not have accidents on principle (transport pilot's bow) . . . it's bad for business!

. . . . . .

The other sort of individual, who does not recognise fear, is unable to appreciate the cause of fear in a crisis, and in my humble opinion, passes into a sort of trance, or what may be described as a reactive psychological amnesia, from which he emerges only when the danger is past. This, I feel sure, accounts for the failure of pilots to take the correct action in dangerous circumstances

I remember sitting beside a pupil doing an approach at night. The flare path was on a plateau several hundred feet above sea level. It was one of those cross-country "find the beacon then the flare path" approaches. It started with an emotional reaction at finding the flare path so far away, gradually passing to a "throttle-arm" paralysis. The pupil then discovered that the control column wouldn't work either. It would produce speed or diminution of rate of descent . . . but not both . . . the flare path got flatter and flatter and finally disappeared altogether. At this point the emotion so induced became too much for him, and he appeared to pass into the trance described above. Physical responses remained active, and when the altimeter showed zero feet a hand moved lethargically and closed the throttles. Fortunately the instrument had been set a airdrome level, and in a few moments, on full throttle, the flare path appeared below. The pupil recovered from his amnesia, reassured by these manifestations of safety, and carried on.

Fear is useful in flying only in relation to an ability to appreciate the causes of it, but at the same time it is a powerful emotion capable of destroying initiative. In the presence of danger, the mind is filled and hampered with an unreasoning desire to save or rather preserve life. This usually takes the form of a desire to maintain a *status quo*—an old lady will remain in a burning building rather than move "because it has always been safe there." Similarly otherwise sane pilots will attempt a landing in bad visibility or if lost at night, even if the aircraft is flying well and with enough petrol to carry on until morning or until the weather clears.

As fear is an emotion and, therefore, reactive, it may be directed, but not eliminated. A fear reaction at the prospect of loss of life can be reduced by a decision that life, or any other item, is not of great value. But such decisions are not spontaneous, and cannot be achieved without careful thought and adjustment. In non-operational flying a resolute sublimation of fear appears to be a definite advantage, as it removes the hazard of impediment in judgment and action at the times when the latter are urgently required.

It is worth referring to the fact that fear prior to a crash aggravates the condition of shock which is usually the "priority" medical condition immediately after a crash and impairs the capacity to recover from injuries received. In conclusion I should like to state that the above are my own impressions and as such are probably only approximately true.

NOEL JACKSON, M.B., B.S.

BOMBER ARMAMENT

Something Heavier than 0·303 Guns Needed

ON seeing the photographs of the new Halifax bomber I was very surprised to see that it was fitted with a four-gun Boulton Paul turret in tail and dorsal positions. The guns in these are of only 0.303 cal. Surely the obvious choice should have been two 0.5 cal. machine guns. The latter would give a weight of fire of 196 lb./min. compared with the 110 lb./min. of the former. On the other hand, the rate of fire on the former is greater, but the striking power less.

We are well to the fore in fighter armament, but we seem to be behind in the question of bomber armament. It was British ingenuity that gave us the power-operated gun turret; let us not be left behind now.

Our bombers were designed to carry large loads long distances, and this policy has proved itself to be wise. If our "heavies" had larger calibre guns, the bomb load would suffer. A good example of this is the Fortress. It is heavily armed with thirteen guns, twelve of them being of 0.5 calibre, but the bomb load is only about a third of that on the Lancaster. Reports that the Fortress can carry ten tons of bombs are untrue.

The best solution is to use our heavy bombers at night and the American types during the day, but why do the Americans bomb from high levels? Surely success could be obtained at low-level bombing after the style of the Lancaster daylight raid on Le Creusot, when only one aircraft was lost. Admittedly this attack was over less heavily defended territory than the Fortresses generally operate, but it would, in my opinion, be worth trying. Low-level attacks by aircraft like the Mosquito have also proved successful and can be carried out on many more days of the year than can the high-level attacks. I think that the Mosquito is the most valuable weapon turned out in this war and is a fine piece of work. Another form of attack is the fighter/bomber, which is best used against airfields and communications targets. In this way it can cause a great deal of disorganisation. Let us hope that when details of another heavy bomber are released it will mount something heavier than the 0.303 calibre machine gun in its armament.

A. T. HENSHAW (536 Flight, A.T.C.).

REVERSE PITCH AIRSCREWS

Their Possible Use as Dive Brakes

AFTER reading recent articles on the dive bomber I have been considering the problem of air braking, and would like to hear the views of fellow readers upon an idea which, on the surface, appears to me to be potentially the most effective method of braking aircraft, either when diving or landing.

The idea is to use a V.P. airscrew capable of turning its blades past fine pitch and, theoretically, into reverse, so that it would screw backwards without altering its rotational direction.

Mechanically, this would be a comparatively simple proposition, but, aerodynamically, it becomes rather complicated, and it is upon this point that the views of wiser and more learned readers than myself would be greatly appreciated.

K. V. P.

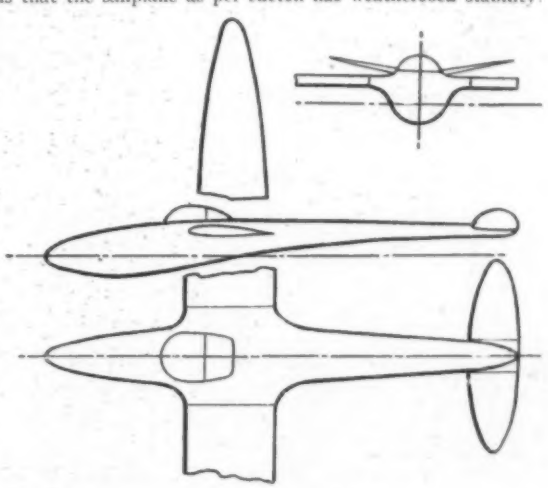
SAILPLANE EFFICIENCY

Weathercock Stability : Puzzle, Find the Rudder!

I WOULD like to thank Mr. Palmer for his trouble in calculating out the efficiency of my glider. Actually, what I desired was a reply from an experienced gilder builder, but Mr. Palmer's reply is very welcome. I confess not to have known what "Jones Efficiency" is.

He complains of a lack of information. I purposely kept back any really useful information in my reliance on man's inquisitiveness to learn more.

My "first objective being captured," I would like to advance a little farther. The accompanying sketch is *not* to scale, but gives the main outline of the sailplane. The rudder is not shown, but is actually in the sketch. Where it is or how it works, I prefer to keep to myself meantime. All I will say is that the sailplane as per sketch has weathercock stability.

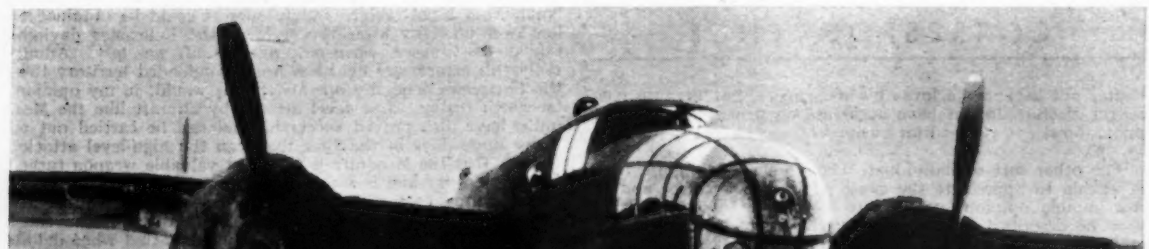


Here are some of the main figures and facts:—

Wings: Elliptical; aspect ratio 20:1; section R.A.F.38; loading 4 lb./sq. ft.; Reynolds number (mean) approx. 1,100,000.

Body: Fitted with retractable undercarriage; pilot sits back at 45 deg. Head vertical. Tailplane is pendulum and has dihedral.

J. R. LAWSON.



COLD COMFORT : Pre-heating the engines of a Mitchell at an Alaskan airfield. A small petrol engine fans warm air through insulated pipes to hoods enclosing the engines. If this is not done the engines are immovable with cold.

SERVICE AVIATION

Royal Air Force and Fleet Air Arm News and Announcements

Awards

Jena Raid

THE KING has been graciously pleased to approve the following awards in recognition of gallantry displayed in flying operations against the enemy :—

Bar to Distinguished Service Order

Act. Wing Cdr. R. W. REYNOLDS, D.S.O., D.F.C., No. 139 Sqn.

Distinguished Service Order

Act. Sqn. Ldr. W. W. BLESSING, D.F.C., R.A.A.F., No. 105 Sqn.

Act. Flt. Lt. E. B. SISMORE, D.F.C., R.A.F.V.R., No. 139 Sqn.

Distinguished Flying Cross

F/O. F. M. FISHER, No. 105 Sqn.

Distinguished Flying Medal

Flt. Sgt. L. HOGAN, No. 105 Sqn.

On the 27th May, 1943, a force of bombers was detailed to attack targets at Jena, Germany, in daylight. The operation called for a high degree of skill, and necessitated a flight over strongly defended areas and difficult terrain. Whilst still a considerable distance from the target, the weather deteriorated and visibility became very poor. Nevertheless, the objective, far away in enemy territory, was reached according to plan. In spite of balloon defences and in the face of fierce anti-aircraft fire, a low-level attack was pressed home with great vigour. The success achieved reflects the greatest credit on the efforts of the above-named personnel who took part in the operation in various capacities, as members of aircraft crews. Their skill, courage and determination were of a high order.

THE KING has been graciously pleased to approve the following awards in recognition of gallantry and devotion to duty in the execution of air operations.

Bar to Distinguished Service Order

Act. Wing Cdr. D. PEVELER, D.S.O., D.F.C.—Wing Cdr. Peveler has been in charge of an O.T.U. detachment since October, 1942. The exceptionally high standard of morale attained has been largely due to the skill and leadership of this officer. Undeterred by adverse weather, he has invariably taken part in searches for missing aircraft and has worked long hours uncomplainingly.

Distinguished Service Order

Act. Group Capt. O. R. DONALDSON, D.F.C., No. 7 Sqn.—Group Capt. Donaldson has completed a large number of sorties since the award of the D.F.C. Each operation is most carefully planned and executed, and nothing which deserved his personal attention is omitted. Group Capt. Donaldson's firm and tactful handling of aircrews, his cheerful spirit and devotion to duty, have earned him the unswerving loyalty of all ranks. He is a skilful pilot with a fine record of successful bombing sorties against the enemy.

Act. Group Capt. A. J. W. GEDDES, O.B.E.—Group Capt. Geddes has obtained some exceptionally fine photographs, which involved flying at low altitude in the most heavily defended areas on the coast of France. This officer's personal leadership and example have been a source of inspiration, not only to his own, but also to neighbouring wings, and has earned the commendation of the Army Commander, South Eastern Command.

Wing Cdr. G. L. GOMM, D.F.C., No. 467 (R.A.A.F.) Sqn.—Since being awarded the D.F.C., Wing Cdr. Gomm has completed a large number of sorties, including 19 night-fighter patrols with Fighter Command. After training the personnel of his squadron, he has himself participated in a number of highly successful bombing raids, the majority of which have been against heavily defended targets. On operations Wing Cdr. Gomm has displayed exceptional courage and has consistently obtained excellent photographs.

Act. Wing Cdr. R. G. BARRELL, D.F.C., R.A.F.V.R., No. 7 Sqn.—This officer has completed a large number of operational sorties against German and Italian targets. He is an outstanding operational captain who has consistently displayed courage and devotion to duty of a very high order in the face of the enemy.

Act. Wing Cdr. G. W. HOLDEN, D.F.C., R.A.F.V.R., No. 102 Sqn.—Wing Cdr. Holden has commanded this squadron since October, 1943, during which time he has completed a number of successful operational sorties. In March, 1943, he captained a crew on their first sortie and obtained an excellent photograph. It is typical of this officer's enthusiasm and devotion to duty that, although handicapped by ill-health, he continued with his tasks uncomplainingly.

Act. Sqn. Ldr. W. H. B. HILES, D.F.C., R.A.F.V.R., No. 218 Sqn.—Sqn. Ldr. Hiles has been flying on operations since May, 1941, and has completed numerous sorties since being awarded the D.F.C. He always presses home his attacks in the most determined manner, flying at low altitude regardless of enemy opposition.

Act. Sqn. Ldr. G. G. PETTY, D.F.C., No. 207 Sqn.—Since this officer was awarded the D.F.C., he has taken part in a further number of sorties, many in adverse weather. He has participated in attacks against the most heavily defended German targets, securing some excellent photographs. In addition, Sqn. Ldr. Petty trained the squadron in formation flying and led them in the two daylight raids on Le Creusot and Milan.

Flt. Lt. P. I. CUNLIFFE-LISTER, A.A.F.—Before joining his present unit, Flt. Lt. Cunliffe-Lister accomplished 63 operational sorties. Since then he has been successful in training many aircrews, not only in flying duties, but also in meteorological reporting. He has never allowed the claims of these duties to stand in the way of operational work, and has completed 21 sorties into enemy territory. On three recent occasions, this officer has undertaken important reconnaissances, bringing back valuable information from each.

Act. Flt. Lt. O. W. REES, D.F.C., R.A.F.V.R., No. 35 Sqn.—Flt. Lt. Rees has completed a large number of operational missions, many of them since the award of the D.F.C. Flt. Lt. Rees has participated in night-bombing sorties over all the most important targets in Germany, Italy and occupied territory.

Act. Flt. Lt. J. H. STICKELL, D.F.C., R.C.A.F., No. 7 Sqn.—During a most successful tour of operational duty in heavy bomber aircraft, this officer has proved himself to be a most valuable member of his squadron. Since the award of the D.F.C. in November, 1942, Flt. Lt. Stickell has completed numerous sorties, all of them against heavily defended targets in enemy territory.

P/O. V. S. MOORE, D.F.M., R.N.Z.A.F., No. 83 Sqn.—This officer, since the award of the D.F.M., has completed a large number of missions, always attacking the target with skill and determination. Nearly all the missions in which he has participated have been against heavily defended targets, and have included three attacks on Berlin.

Bar to Distinguished Flying Cross

Wing Cdr. J. MACK. SOUTHWELL, D.F.C., No. 9 Sqn.—Since being awarded the D.F.C. this officer has completed a further number of operational

sorties. During the period of his command the squadron has had many successes.

Sqn. Ldr. G. HALL, D.F.C., R.A.F.V.R., No. 61 Sqn.—Since the award of the D.F.C. this officer has completed a further number of operational sorties. He has constantly obtained successful photographs of the target area, and good reports of the result of his bombing, which have proved of immense value in assessing the results of the attacks.

Sqn. Ldr. P. WARD-HUNT, D.F.C., R.A.F.O., No. 106 Sqn.—Since the award of the D.F.C. in January, 1941, Sqn. Ldr. Ward-Hunt has completed a large number of operational sorties. He recently participated in a number of successful bombing raids, including one on Berlin. In March, 1943, he took part in raids on Essen, where, undeterred by fierce opposition, he pressed home his attacks with resource and determination, obtaining a useful photograph on the second occasion. He has also participated in successful mining sorties in the Baltic.

Act. Sqn. Ldr. F. H. BOWDEN, D.F.C., R.A.F.V.R., No. 428 (R.C.A.F.) Sqn.—Sqn. Ldr. Bowden has completed a further number of operational sorties since being awarded the D.F.C. On one occasion when detailed for an attack on Lorient, he made six runs over the target to drop a bomb which had failed to release.

Act. Sqn. Ldr. G. W. O'N. FISHER, O.B.E., D.F.C., No. 101 Sqn.—Sqn. Ldr. Fisher was awarded the D.F.C. in February, 1941, and since then has completed many operational sorties. In February, 1943, by his prompt action and fearlessness, he succeeded in extricating a crew from a burning aircraft, though he knew the petrol tanks were likely to explode at any moment. In the air his missions included sorties against such heavily defended targets as Hamburg, Cologne and Berlin, and Tripoli and Benghazi in the Middle East.

Act. Sqn. Ldr. G. W. GILPIN, D.F.C., R.A.F.V.R., No. 61 Sqn.—Since the award of the D.F.C. this officer has taken part in numerous operational sorties. Sqn. Ldr. Gilpin's fine leadership and the excellent co-operation of his crew has enabled him to drive off night fighters on four occasions. On one of his missions his aircraft was attacked twice by single fighters and later by two enemy aircraft working together. His control of the aircraft was such that his gunners were able to engage the enemy, and one fighter dived away with black smoke pouring from it. In spite of a fire in his own aircraft, caused by a cannon shell, Sqn. Ldr. Gilpin flew the bomber safely to base and made a good landing.

Act. Sqn. Ldr. D. IVESON, D.F.C., R.A.F.V.R.—This officer has completed a long and successful tour of operations. He took part in the daylight raids against the German battle cruisers at Brest in December, 1941, and was awarded the D.F.C. for his part in the attack on the enemy naval base at Trondheim in April, 1942. Since then Sqn. Ldr. Iveson has taken part in numerous sorties over targets in Germany and the Middle East. On one occasion he skilfully led a section in a daylight raid on Heraklion, and after securing excellent photographs withdrew without his aircraft having sustained any serious damage. On another occasion he made a successful low-level attack on gun emplacements.

Act. Sqn. Ldr. R. A. V. GASCOYNE-CECIL, D.F.C., R.A.F.V.R., No. 61 Sqn.—This officer has taken part in numerous operational sorties since the award of the D.F.C. Many of these sorties have been against such strongly defended targets as Berlin, Lubeck, Essen and Spezia.

Flt. Lt. K. G. TEW, D.F.C., R.A.F.V.R., No. 97 Sqn.—This officer has now completed a second tour of operations. His sorties have included attacks on Berlin, Essen, Hamburg and other heavily defended German centres. He has completed sorties since being awarded the D.F.C.

Act. Flt. Lt. W. W. BOYLSON, D.F.C., R.A.A.F., No. 7 Sqn.—This officer has a consistent record of successfully completed operations over a long period. Since being awarded the D.F.C., Flt. Lt. Boylson has participated in numerous operational sorties.

Act. Flt. Lt. W. H. JONES, D.F.C., R.A.F.V.R., No. 7 Sqn.—Flt. Lt. Jones has taken part in many attacks against the enemy's most heavily defended and distant targets. His very high sense of duty, combined with the qualities of cool courage and determination, have resulted in many successes.

Act. Flt. Lt. H. SHAPIRO, D.F.C., R.C.A.F., No. 7 Sqn.—A conscientious and reliable navigator, this officer has always executed his tasks in a very commendable manner, while his untiring efforts have played no small part in the successes achieved.

Act. Flt. Lt. K. MUNRO, D.F.C., R.A.A.F., No. 10 Sqn.—Since being awarded the D.F.C. in November, 1942, this officer has completed a further number of operational sorties. On one occasion his aircraft was attacked simultaneously by a Fw 190 and a Me 110. The Me 110 was shot down, and by skilful evasive action the attack of the Fw 190 was frustrated.

Act. Flt. Lt. R. G. WHITEHEAD, D.F.C., R.A.F.V.R., No. 44 Sqn.—This officer has completed his second tour of operations in command of a flight of heavy bombers. On one occasion shortly after taking off for a distant target one engine failed. In spite of low cloud and the length of the flight, Flt. Lt. Whitehead persisted in his mission and accomplished it successfully. On the return flight a second engine failed, but by skilful airmanship he brought his aircraft and crew safely back to base.

Distinguished Flying Cross

Act. Group Capt. R. A. C. CARTER, D.S.O., No. 103 Sqn.—Since being awarded the D.S.O. Group Capt. Carter has participated in a number of operational sorties over enemy territory, including attacks on targets at Aachen, Essen, Hamburg and Mannheim. He has obtained some excellent photographs.

Wing Cdr. D. A. R. BRADSHAW, R.C.A.F., No. 420 Sqn.—This officer has a splendid record both as an operational pilot and as a squadron commander. Wing Cdr. Bradshaw has taken part in many operational sorties to difficult targets and through adverse weather, always completing his tasks in an exemplary manner.

Act. Wing Cdr. J. C. CLAYDON, No. 90 Sqn.—Wing Cdr. Claydon has completed a large number of operational sorties, including attacks against some of the most heavily defended enemy targets. He has also participated in many mine-laying operations.

Act. Wing Cdr. R. A. REDDICK, A.F.C., No. 101 Sqn.—This officer has shown exceptional qualities of leadership and initiative as squadron commander and has also taken part in frequent operational sorties with courage, skill and determination.

Act. Wing Cdr. D. W. M. SMITH, No. 428 (R.C.A.F.) Sqn.—Wing Cdr. Smith has completed a large number of operational sorties, ten of them being daylight raids. He is an ideal leader and his cheerful courage and unselfishness have been a great factor in the squadron's success.

Act. Wing Cdr. R. C. A. WADDELL, R.C.A.F., No. 400 Sqn.—This officer flew during the Dieppe combined operations and since has taken part in many operational sorties, including a number of anti-shipping patrols. On one occasion he penetrated far over France, where he damaged a locomotive, and returned with an excellent and valuable report.

Act. Sqn. Ldr. P. BILLYEALD, R.A.F.V.R., No. 464 (R.A.A.F.) Sqn.—Sqn. Ldr. Billyeald has completed numerous operational missions, most of them as flight commander. He has invariably displayed keenness, determination and leadership of an exceptional nature.

Flt. Lt. F. B. Sismore, D.F.C. (Wing Cdr. Reynolds' navigator), now has the D.S.O. The official citation appears on the opposite page.

Act. Sqn. Ldr. T. C. COOKE, A.F.C., D.F.M., R.A.F.V.R., No. 214 Sqn.—This officer has taken part in many attacks, some of them on the most strongly defended targets in Germany. During an attack on the Ruhr in May, 1942, Sqn. Ldr. Cooke skilfully evaded five determined attacks by enemy night fighters. Later, while operating over Bremen, his aircraft was severely damaged by the enemy ground defences and a petrol pipe was severed. Despite this damage, Sqn. Ldr. Cooke flew the aircraft safely to base.

Act. Sqn. Ldr. J. L. SAVARD, R.C.A.F., No. 425 (R.C.A.F.) Sqn.—Sqn. Ldr. Savard has taken part in numerous operational sorties, many against the most heavily defended enemy targets. He has throughout demonstrated his courage on operations, being most keen to participate in attacks against strongly defended objectives.

Flt. Lt. J. W. BISHOP, R.A.F.V.R., No. 420 (R.C.A.F.) Sqn.—This officer has completed all his operations in a skilful and determined manner. On one occasion, when flying at very low level during a bombing sortie, Flt. Lt. Bishop's aircraft was illuminated by searchlights. With great skill he shot out three searchlights in rapid succession, thus enabling his captain to extricate the aircraft from a perilous situation.

Flt. Lt. D. H. L. FARMER, No. 21 Sqn.—This officer has had a long and distinguished operational record, which has included raids on many difficult targets both in Europe and the Middle East.

Flt. Lt. W. T. GRAY, D.F.M., No. 50 Sqn.—In addition to attacks on the enemy's most heavily defended German targets, Flt. Lt. Gray took part in the successful daylight raids on Le Creusot and Milan.

Flt. Lt. J. L. MUNRO, R.N.Z.A.F., No. 97 Sqn.—This officer has taken part in numerous operational flights, many of them against the most heavily defended German and Italian targets. He has invariably pressed home his attacks with great courage and determination.

Flt. Lt. J. WARREN, R.A.F.V.R., No. 487 (N.Z.) Sqn.—Flt. Lt. Warren has taken part in a number of operational missions, including the combined operations at Dieppe and the low level attack on the Philips Works at Eindhoven. After he completed ten operations he was wounded in the leg.

Flt. Lt. G. A. WILSON, No. 487 (N.Z.) Sqn.—A thoroughly efficient, enthusiastic and determined navigator, this officer has participated in many operational sorties. Throughout a long period of operational flying he has set a splendid example.

Two Tours of Duty

Flt. Lt. E. C. J. WOOD, R.A.F.V.R., No. 50 Sqn.—Flt. Lt. Wood has completed two tours of operational duties as bomb aimer. Many of his sorties have included attacks on the most heavily fortified centres in Germany and Italy. From these he has secured many valuable photographs. In December, 1942, Flt. Lt. Wood took part in a low level raid on a target in North West Germany, during which he made five runs over the target before dropping his bombs.

Act. Flt. Lt. R. ADAMS, R.A.F.V.R., No. 61 Sqn.—An outstanding navigator, Flt. Lt. Adams has participated in a large number of operational sorties, including the daylight raid on Le Creusot.

Act. Flt. Lt. L. S. ANDERSON, R.C.A.F., No. 420 (R.C.A.F.) Sqn.—Flt. Lt. Anderson has always pressed home his attacks with great vigour and determination, and has secured many excellent photographs. He has completed operational missions against practically every heavily defended enemy target, including Hamburg, the Ruhr, Cologne and Bremen, in addition to two sorties to Italian objectives and several minelaying operations.

Act. Flt. Lt. J. BAKER, R.A.F.V.R., No. 35 Sqn.—During the many night operations this officer has been engaged upon, his work as navigator has been conspicuous for its skill and determination. He has guided his captain through the enemy defence to release his bombs with unvarying accuracy, achieving excellent results.

Act. Flt. Lt. T. W. BLAIR, R.A.F.V.R., No. 83 Sqn.—Flt. Lt. Blair has completed a very large number of operational sorties, during which he has attacked such heavily defended targets as Berlin, Essen, Hamburg, Bremen and Cologne. On one occasion, during a daylight attack on Danzig, despite appalling weather, he successfully guided his pilot to the target and safely back. On at least two other occasions, when his aircraft was illuminated by searchlights and hit by anti-aircraft fire, this officer's able assistance enabled his pilot to complete the mission successfully and obtain some excellent photographs.

Act. Flt. Lt. K. BLYTH, R.A.F.V.R., No. 78 Sqn.—In spite of the claims of this officer's duties as squadron navigator officer, he takes part in operational sorties on every possible occasion. This skilled and courageous observer has taken part in sorties against Cologne and Essen, and other strongly fortified targets, with outstanding success.

Act. Flt. Lt. W. H. A. BRADSHAW, R.A.F.V.R., No. 487 (N.Z.) Sqn.—Flt. Lt. Bradshaw has completed numerous operational missions, both from this country and in North Africa. He has a long and distinguished record of tasks successfully accomplished, which have included sorties to Cologne and heavily defended enemy targets in occupied France. He has also taken part in many sea sweeps off the Norwegian coast.

Act. Flt. Lt. H. G. CANNON, R.A.F.V.R., No. 196 Sqn.—Flt. Lt. Cannon has flown on operations since May, 1940, and is now on his second tour of operational duty. He has completed a large number of successful sorties, many of which have been against the enemy's most heavily defended targets. In July, 1940, this officer's aircraft was attacked by three twin-engined enemy fighters. He remained cool and efficient, shooting down one attacker.

Act. Flt. Lt. C. V. CIANO, R.A.F.V.R., No. 57 Sqn.—Flt. Lt. Ciano, as captain of aircraft, has taken part in many operational sorties against strongly defended targets in Germany. On each occasion he has captained his crew with vigour, determination and cool courage.

Act. Flt. Lt. R. G. COOK, R.C.A.F., No. 420 (R.C.A.F.) Sqn.—Flt. Lt. Cook has attacked many difficult and dangerous targets, such as Bremen, Cologne and Turin, and has also completed several hazardous minelaying sorties. His courage and devotion to duty on all occasions have been most praiseworthy.

Act. Flt. Lt. W. B. COWAN, R.N.Z.A.F., No. 9 Sqn.—This officer has completed a large number of operational sorties, which have included three attacks on Berlin. He has proved himself a most efficient and extremely conscientious captain of aircraft.

Act. Flt. Lt. W. J. DIERKES, R.C.A.F., No. 61 Sqn.—This officer has flown on a large number of operations, attacking such heavily defended targets as Berlin, Hamburg, Essen, Cologne and Nuremberg. He has also attacked Italian targets at Milan and Spezia, obtaining some excellent photographs. On many occasions this officer's aircraft has been damaged by anti-aircraft fire, but each time he has skilfully flown it back to base.

Act. Flt. Lt. A. D. DOBSON, R.A.F.V.R.—This

officer has completed 33 sorties over enemy territory, both in Europe and the Middle East, and has invariably shown himself to be possessed of courage and determination of a high order.

Act. Flt. Lt. L. EHRMAN, R.A.F.V.R., No. 44 Sqn.—As navigator this officer has flown on operations against some of the enemy's most important and heavily defended targets, including Berlin. On one occasion, in very adverse weather, he successfully navigated his aircraft to Danzig and back.

Act. Flt. Lt. H. K. EWING, R.A.F.V.R., No. 90 Sqn.—This officer has taken part in a large number of operations, during which he has invariably shown the greatest skill and determination as an air gunner. He is now on his second operational tour.

Act. Flt. Lt. D. R. FISHER, D.F.M., R.A.F.V.R., No. 77 Sqn.—When flying as captain of aircraft on a sortie to Rostock, his aircraft sustained severe damage from anti-aircraft fire while some 140 miles from the target. Despite this, he completed his mission, and then flew the aircraft safely to base. More recently, while on a mine-laying sortie, his aircraft again sustained damage of a serious nature when it was hit by fire from anti-aircraft ships. Flt. Lt. Fisher, displaying great skill and resonrce, was able to fly safely to base.

Act. Flt. Lt. D. C. HAGERMAN, R.C.A.F., No. 12 Sqn.—Flt. Lt Hagerman has taken part in attacks against targets at Kiel, Essen, Dusseldorf, Cologne, Milan, Hamburg and Berlin, each time encountering heavy opposition. In October, 1942, during a sortie to Kiel, his aircraft became involved in a collision with another bomber. The aircraft became uncontrollable, and fell 8,000 feet. Displaying skill, courage and determination, this airman then regained control and extricated his crew from a perilous situation.

Act. Flt. Lt. V. H. HARLEY, R.A.A.F., No. 83 Sqn.—This officer has completed numerous operational sorties, in the majority of which he has been employed as bomb aimer. He has participated in attacks on the most heavily defended targets in Germany and Italy, including Essen and Berlin. In March, 1943, whilst attacking Munich, Flt. Lt. Harley's aircraft was subjected to very heavy fire from ground defences and illuminated by searchlights. This officer's skilful instructions enabled his pilot to take the necessary evasive action, and successfully complete the mission.

Evasive Action

Act. Flt. Lt. G. L. R. HEYWOOD, R.N.Z.A.F., No. 75 (N.Z.) Sqn.—This officer is an excellent gunner and gunnery leader. On one occasion, when his aircraft was attacked by fighters, he gave his pilot a calm and accurate commentary on the movements of his assailants, and was largely instrumental in ensuring the eventual escape of the aircraft from damage.

Act. Flt. Lt. J. S. HITCHCOCK, R.A.F.V.R., No. 78 Sqn.—This officer has completed a very large number of operational sorties. On several occasions he has returned in a badly damaged aircraft. Flt. Lt Hitchcock, throughout two tours of operational duty, has displayed outstanding qualities of enthusiasm and devotion to duty.

Act. Flt. Lt. P. McG. JACKSON, R.A.F.V.R., No. 35 Sqn.—This officer has participated in a large number of successful sorties. Flt. Lt. Jackson's sorties have included attacks on many of the most strongly defended towns in Germany, and he has raided Turin on four occasions.

Act. Flt. Lt. J. H. KENNY, R.A.F.V.R.—Flt. Lt. Kenny has proved himself to be a courageous and skilful captain of aircraft, who has taken part with good effect in raids, both from home bases and bases in the Middle East.

Act. Flt. Lt. V. D. KNOX, R.A.F.V.R.—Flt. Lt. Knox has completed an exceptionally long tour of operational duty, both from this country and the Middle East. Flt. Lt. Knox has taken part with distinction in operations over many strongly defended targets, including Essen, Cologne, Berlin and places in Crete and Libya.

Act. Flt. Lt. D. F. LEGGATE, R.A.F.V.R., No. 161 Sqn.—Flt. Lt. Leggate has completed a large number of operational sorties, and has met with great success. He is a first-class pilot and captain of aircraft, who has attacked targets in many heavily defended areas of Germany and occupied territory.

Act. Flt. Lt. P. D'A. McGEE, R.C.A.F., No. 207 Sqn.—Throughout his operational career this officer has displayed enthusiasm and keenness for operational flying. On one occasion, during an attack on Turin, his aircraft was damaged by anti-aircraft fire and its load of incendiary bombs set on fire. Although the fire made his aircraft visible to the enemy, he continued his mission and bombed the target.

Act. Flt. Lt. W. E. ROBERTS, R.A.A.F., No. 57 Sqn.—Since joining the squadron Flt. Lt. Roberts has flown on sorties against some of the most heavily defended targets in Germany. He has always shown the greatest determination in pressing home his attacks.

Act. Flt. Lt. G. M. SHINNIE, R.A.F.V.R., No. 646 (R.A.A.F.) Sqn.—Flt. Lt. Shinnie is an extremely keen and capable air gunner, who has flown on numerous operational flights. His speed and coolness in giving directions and commentaries from the astro hatch have proved invaluable to his captain.

Act. Flt. Lt. F. D. SMITH, R.C.A.F., No. 51 Sqn.—This officer has taken part in numerous sorties over enemy territory. Amongst his objectives have been Essen, Munich, Cologne and Berlin. He has also completed many daylight anti-submarine sweeps. On one occasion his aircraft was attacked by three Arados 196, and it escaped after a running fight in which one enemy aircraft was destroyed and one damaged.

Act. Flt. Lt. F. A. G. TOMPKINS, R.A.F.V.R., No. 7 Sqn.—This officer has taken part in many operations. He has participated in raids against the most strongly defended towns in Germany and against Genoa, Turin and Milan.

SERVICE AVIATION

Distinguished Flying Medal

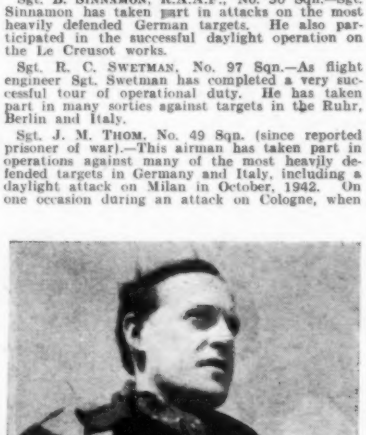
Flt. Sgt. F. S. DEVEREUX, No. 10 Sqn.—On one occasion, Flt. Sgt. Devereux's aircraft crashed on returning from Bremen, and on another, he was forced to leave it by parachute. Several times his bomber has been attacked by enemy night fighters, but despite these harassing experiences, his enthusiasm for operational flying remains undiminished. He has taken part in sorties against Bremen, Kiel, Berlin and in minelaying operations.

Sgt. R. C. SIMENDINGER, No. 78 Sqn.—Sgt. Simendinger, a very efficient bomb aimer, has completed a tour of operational duty during which he has maintained a very high standard of efficiency.

Sgt. B. SINNAMON, R.A.A.F., No. 50 Sqn.—Sgt. Sinnamon has taken part in attacks on the most heavily defended German targets. He also participated in the successful daylight operation on the Le Creusot works.

Sgt. R. C. SWETMAN, No. 97 Sqn.—As flight engineer Sgt. Swetman has completed a very successful tour of operational duty. He has taken part in many sorties against targets in the Ruhr, Berlin and Italy.

Sgt. J. M. THOM, No. 49 Sqn. (since reported prisoner of war).—This airman has taken part in operations against many of the most heavily defended targets in Germany and Italy, including a daylight attack on Milan in October, 1942. On one occasion during an attack on Cologne, when



Wing Cdr. P. M. Brothers who has been awarded a Bar to his D.F.C.

making his bombing run, drifting cloud obscured the target. In the face of intense opposition Sgt. Thom made a second run enabling the bombs to be released with greater accuracy. On another occasion this airman was detailed for an attack on a target at Turin. While still some distance away his aircraft was repeatedly hit by anti-aircraft fire; nevertheless, with great determination Sgt. Thom pressed on and successfully completed his mission.

Sgt. A. WILLIAMS, No. 49 Sqn.—Sgt. Williams has participated in attacks on many of the most heavily defended German targets, including Berlin, Hamburg and the Ruhr. He also took part in the daylight raid on Le Creusot.

Flt. Sgt. E. A. HINE, R.C.A.F., No. 142 Sqn.—This airman has taken part in 32 sorties. He is a cool and efficient air gunner, whose excellent work has on occasions contributed to the safe return of his aircraft.

Sgt. F. CAMPBELL, No. 93 Sqn.—This airman has taken part in 105 sorties. In the campaign in North Africa he has participated in many attacks on enemy transport, causing destruction. In air combat Sgt. Campbell has destroyed two enemy aircraft.

Sgt. L. W. EVANS, No. 142 Sqn.—Sgt. Evans has completed 24 sorties. He is an excellent captain, whose efficiency and confidence have inspired his crew, resulting in a fine record of successful sorties.

Sgt. A. J. OWEN and Sgt. J. S. V. MCALLISTER, both of No. 600 Sqn.—As pilot and observer of aircraft respectively, these airmen have displayed great skill. They have destroyed three enemy aircraft at night.

Sgt. J. P. G. BLANCHET, and Sgt. R. H. D. WILSON, both of No. 35 Sqn.—These airmen have displayed high qualities of courage and fortitude in air operations. Their exemplary conduct has been worthy of the highest praise.

Flt. Sgt. F. J. HIGGINS, R.C.A.F., No. 427 (R.C.A.F.) Sqn.—Flt. Sgt. Higgins piloted an aircraft detailed to attack a target in S.W. Germany one night in April, 1943. Shortly after bombing the target the aircraft was hit by anti-aircraft fire. Much damage was sustained. In difficult circumstances, Flt. Sgt. Higgins flew the aircraft to an airfield in this country, where he effected a successful crash-landing.

Sgt. E. BROADBENT, No. 57 Sqn.—One night in April, 1943, this airman captained an aircraft which attacked Duisburg. On the return flight, the bomber was attacked by an enemy fighter and sustained damage. Sgt. Broadbent was wounded in the hand and shoulder but, displaying great skill, he evaded the attacker and flew the damaged bomber to base. Although the starboard and tail wheel tyres were punctured, and the hydraulic system damaged, Sgt. Broadbent landed the aircraft safely.

Sgt. H. J. DALZELL, R.N.Z.A.F., No. 75 (N.Z.) Sqn.—One night in April, 1943, this airman was the pilot of an aircraft which participated in an attack on Rostock. On the return flight, some 400 miles from base the aircraft came into collision with another aircraft, overtaking from the rear. Damage was sustained to the fin and rudder, causing temporary loss of control. Skilfully and confidently, Sgt. Dalzell regained control and kept to his course. Several attempts were made to straighten the fin but they proved unavailing. Despite this, Sgt. Dalzell flew the aircraft back to base.

Sgt. F. J. PARKINSON, No. 600 Sqn.—On one occasion in April, 1943, this airman was engaged on a patrol. When returning to base, although a considerable distance out over the sea, he saw an enemy aircraft approaching head on in the early light of the dawn. A running fight ensued, lasting for 35 minutes. During the engagement the enemy aircraft took violent evasive action, but displaying great determination and accurate deflection shooting, Sgt. Parkinson eventually shot the enemy aircraft down. In the combat, such was his tenacity that, when the aircraft were approaching each other head on, Sgt. Parkinson would not deviate and forced his adversary to do so. This airman eventually landed at base, having only a few gallons of petrol left in each tank.

Over Stettin

Sgt. F. H. HUNTLEY and Sgt. A. STOTT, both of No. 50 Sqn.—One night in April, 1943, Sgts. Huntley and Stott were pilot and rear gunner of an aircraft detailed to attack Stettin. Whilst over enemy territory the aircraft was attacked by three enemy fighters. In the ensuing engagement Sgt. Stott, skilfully using his guns, drove off two of the attackers and shot the other one down in flames. The bomber had sustained much damage, however, making it difficult to control. Despite this, Sgt. Huntley flew the aircraft back to an airfield in this country, making a successful landing without the aid of flaps.

Flt. Sgt. D. J. APPLETON, No. 120 Sqn.—This airman has been employed on operational flying for over two years. During that time he has completed numerous missions, which have included long range reconnaissance of enemy coasts, anti-shipping patrols and convoy escort duties. While on escort duty his crew has sighted 20 enemy submarines and attacked 12.

Flt. Sgt. S. H. BALKWILL, R.C.A.F., No. 39 Sqn.—As pilot, this airman has taken part in 20 sorties from Malta, three of which have been torpedo strikes. In February, 1943, he was detailed to make an attack on enemy shipping off Maritimo. While over the target the airman was subjected to intense anti-aircraft fire and repeatedly hit in the fuselage and tail. Serious damage was sustained, which made the aircraft difficult to control, but despite this Flt. Sgt. Balkwill, with great skill and courage, succeeded in returning to base safely.

Flt. Sgt. R. McD. BEATTIE, R.A.A.F., No. 37 Sqn.—In December, 1942, when detailed to attack Heraklion in Crete, his aircraft was hit and damaged by an anti-aircraft shell. The aircraft became very difficult to control, and only by most skilful handling did Flt. Sgt. Beattie succeed in manœuvring it back to base. One night in March, 1943, Flt. Sgt. Beattie took part in operations against enemy troop concentrations in the battle area and completed his sortie successfully in spite of the fact that he and his crew had previously to refuel the aircraft unaided.

Flt. Sgt. R. T. BEDFORD, No. 120 Sqn.—Before joining his present unit, Flt. Sgt. Bedford completed over 50 bombing raids on targets in Germany and occupied territory. Since then, he has completed a large number of long-range reconnaissances, shipping patrols and convoy escort patrols. Throughout his flying career, he has never had a complete wireless failure, though recently, while on the way to escort an important convoy, his radio apparatus became unserviceable. Flt. Sgt. Bedford dismantled the set and reassembled it in full working order within an hour.

Roll of Honour

Casualty Communiqué No. 247.

THE Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed. Casualties "in action" are due to flying operations against the enemy; "on active service" includes ground casualties due to enemy action, non-operational

flying casualties, fatal accidents and natural deaths.

Of the names in this list, 64 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. L. G. Barlow.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. W. H. Baber; Flt. Sgt. T. F. Beaumont; Sgt. T. W. Belton; Sgt. F. N. Butterworth; Flt. Sgt. T. Cook; Sgt. G. L. Cooper; Act. Flt. Lt. E. V. Darling, D.F.C.; W/O. B. Doyle; F/O. P. L. Edwards; Wing Cdr. J. A. G. Gordon; P/O. A. G. Hersey; Flt. Sgt. P. C. House; P/O. C. E. Hurt; Sgt. G. M. Jones; Sgt. K. A. Lloyd; Sgt. L. D. Lowther; Sgt. B. E. B. Luckman; Sgt. T. H. McGrenery; Sgt. A. Marvell, D.F.M.; F/O. J. H. Menary; Sgt. P. Milnes; Sgt. J. E. Percival; Sgt. A. W. Ragan; Sgt. L. N. Reynolds; Sgt. E. G. Ronson; P/O. G. Teicheira; P/O. E. F. Valentine; Sgt. W. R. Wagstaff; Sgt. E. F. Webb; P/O. K. V. Whelan; F/O. K. D. Wilson, D.F.C.; P/O. P. P. Wilson.

WOUNDED OR INJURED IN ACTION.—F/O. M. F. Armytage; Sgt. L. Bush; P/O. T. E. C. Collinge.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. D. Axtell; Sgt. H. Bateman; Flt. Lt. Davies; F/O. M. Duncan; Sgt. T. Galloway; Flt. Sgt. D. G. Harley; Sgt. R. Henderson; P/O. D. Howlett; Sgt. T. Martin; Sgt. D. H. Reid; P/O. F. M. Thompson; W/O. B. P. West; Sgt. J. W. Young.

MISSING.—Sgt. R. W. Adams; Sgt. J. H. Aspden; Sgt. J. G. Baker; Flt. Sgt. L. W. Baldwin; P/O. H. W. Barnett; F/O. A. D. Baxter; Flt. Sgt. J. A. Beach; Sgt. R. F. Beaumont; Sgt. J. A. Bell; F/O. R. L. Bellamy; Sgt. W. F. Bigga; P/O. K. S. Bird; Sgt. T. Boland; Sgt. A. Bone; Sgt. E. G. Boustead; Sgt. G. Brady; Sgt. L. C. Cameron; Sgt. L. W. Canning; Sgt. M. G. W. Capon; Sgt. T. Carter; F/O. R. F. Clements; Act. Flt. Lt. D. O. Collinge, D.F.C.; P/O. A. N. Cooper; Sgt. A. J. Cousins; Sgt. D. Curtis; Sgt. R. E. Dadd; Sgt. F. P. Dards; Sgt. J. J. Davis; Sgt. W. Davis; F/O. H. H. Day; P/O. R. C. W. Dennis; F/O. H. D. Dixon; Sgt. H. E. Dixon; Sgt. K. C. England; P/O. J. H. Elder; Sgt. T. L. Everden; Sgt. J. Gould; Sgt. J. Goulding; F/O. H. Gray; Sgt. W. G. Groves; Flt. Sgt. T. J. Gwynn; Sgt. J. Hall; Sgt. R. A. Hall; Sgt. W. M. Hamilton; Sgt. T. F. Hayden; F/O. J. W. Holloway; Sgt. T. H. Hutton; Sgt. D. J. A. Hyde; Sgt. W. Illingworth; Sgt. D. F. Inch; Sgt. L. James; Sgt. R. J. Johnson; Sgt. F. J. Knight; Sgt. J. P. Lacy; Sgt. E. M. Lee; Sgt. L. Lewis; Sgt. W. R. McBriar; Sgt. A. F. McDonald; Act. Flt. Lt. G. H. McLachlan; F/O. B. R. McNair, D.F.C.; Sgt. F. McPhillips; Sgt. W. Magee; F/O. J. R. March; Sgt. T. L. Marlow; F/O. A. W. Marsden-Levy; Sgt. R. W. Mason; Sgt. L. C. Minshaw; Act. Flt. Lt. E. G. Mortenson; Sgt. E. Mumme; P/O. J. North; Flt. Sgt. S. F. Pannell; F/O. D. B. Panting; Sgt. J. Parkinson; Sgt. S. W. Patton; P/O. D. C. Payne; Sgt. P. B. Pearson; Flt. Sgt. C. B. Perring; Sgt. R. L. Pierson; Sgt. D. A. Pitman; Sgt. J. Pomfret; Sgt. H. S. P. Radford; Sgt. K. Ray; Sgt. J. H. Reynolds; Flt. Sgt. C. G. Rich; Sgt. N. P. Richmond; Sgt. H. Riley; F/O. T. C. Robinson; Sgt. L. Rudkin; Sgt. T. G. Shergold; P/O. A. F. Sherwin; Flt. Sgt. J. L. Shiells; Sgt. R. S. Sidwell; P/O. M. E. Smith; Sgt. J. A. Smith; Sgt. L. G. Smith; Sgt. R. E. Smith; F/O. J. C. Stevenson, D.F.C.; Act. Wing Cdr. J. G. W. Swain; Sgt. W. C. Tassell; Sgt. E. C. Thomas; Sgt. L. Thompson; F/O. C. Thwaites; F/O. D. A. Trotman; Sgt. D. Wainwright; Sgt. R. F. Wanstall; Flt. Sgt. L. E. Wardhill; Sgt. D. L. Watkins; Sgt. D. M. T. Watts; P/O. J. F. Webb; P/O. C. E. Wellard; Sgt. C. G. West; Sgt. R. A. Whellams; F/O. K. D. Williams; Sgt. V. I. Williams; Sgt G. J. Wilson; P/O. R. G. Wood; Sgt. R. Woodhall; Sgt. G. C. Wright.

KILLED ON ACTIVE SERVICE.—Sgt. C. B. Brockington; Sgt. J. R. G. Calvert; Sgt. P. J. Conwell; F/O. D. B. De Kretser; P/O. G. H. D. Druce; Sgt C. A. Good; Sgt. D. C. Grocock; F/O. P. C. Price; A/C.1 W. T. M. Price; Sgt. R. V. Rosser; Sgt F. C. Townsend; Sgt. H. Wilcock.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—P/O. N. G. Sprake.

WOUNDED OR INJURED ON ACTIVE SERVICE.—A/C.2 A. C. Halford; Sgt. L. J. Hayward; A/C.1 H. G. W. Lamb; L.A/C. A. E. E. R. Nichols; L.A/C T. R. Penny; L.A/C. V. Stephen.

DIED ON ACTIVE SERVICE.—Cpl. G. A. Bolland; L.A/C. A. Briggs; L.A/C. J. Davis; L.A/C. D. M. Dimmer; Cpl. L. C. Fredericks; Act. Cpl. W. Glover; A/C.2 J. Hamme; A/C.2 D. Mason; F/O. C. Morgan; Sgt. E. M. Philpott; A/C.1 H. Ryder.

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. G. G. Buckland.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. A. J. Grabham; P/O. N. W. Richardson, D.F.C.; P/O. C. K. Tait; Sgt. E. D. Williams.

WOUNDED OR INJURED IN ACTION.—F/O. C. B. Anderson.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. R. C. Stuart.

MISSING.—Sgt. P. L. Boasse; P/O. M. A. Harland; Flt. Sgt. R. S. Hogben; Sgt. N. C. Keeffe; Flt. Sgt. E. L. Lancaster; Flt. Sgt. F. McGlinchy; Sgt. I. G. Miller; Act. Flt Lt. B. F. Myers; Flt. Sgt. M. A. B. Watkins.

KILLED ON ACTIVE SERVICE.—F/O. R. R. Hely.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. C. Rhodes.

SERVICE AVIATION

Royal Canadian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. K. H. Taylor.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Act. Flt. Lt. T. W. Allen; Sgt. D. M. Baird; Sgt. J. R. Collins; Sgt. B. A. Dakin; F/O. G. G. O. James; P/O. S. S. Martin; Sgt. R. McA. Neil; Sgt. D. Pearce; Sgt. R. A. Russell; P/O. S. F. Smither; Sgt. I. R. Watson; Sgt. V. B. Whelpley; Sgt. G. L. Wilkinson.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. J. P. Merton.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. D. G. McLoed; Sgt. D. E. Roberts; Flt. Sgt. R. H. Stewart; Sgt. S. Tomyn; F/O. K. H. Waters.

MISSING.—Sgt. K. T. P. Allan; Sgt. S. Archie;

FIVE, AND ONE IN THE BOX: A Thunderbolt formation of the U.S.A.A.F. over the English countryside.

Flt. Sgt. R. J. Barnes; Sgt. J. A. Bessette; Flt. Sgt. R. Birchall; Sgt. A. C. Cantley; Sgt. G. D. Cline; P/O. B. M. Harker; Sgt. G. C. Heming; Sgt. L. M. Horahan; Sgt. J. E. Isaacs; Flt. Sgt. D. E. James; Sgt S. J. Jorgensen; Sgt. J. C. Kennedy; Sgt. J. M Leblanc; Sgt. E. J. Longstaff; W/O. J. S. Phelps; P/O. K. M. Piche; Sgt. L. K. Plank; Sgt. F. A. Robb; F/O. W. M. Struthers; Flt. Sgt. A. R. Twiss; Flt. Sgt. W. J. Watters; Sgt. J. O. Way; Flt. Sgt. E. A. Whalen; Sgt. D. Zaleschuk.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. R. W. Cairns; F/O. G. F. Jackson; F/O. R. B. Reed; F/O. F. G. Willis.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. T. B. Ainger; Sgt. B. J. Daley; Sgt. S. H. Schofield.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. R. C. Anderson; F/O. R. N. Chancellor.

MISSING.—P/O. K. F. Debenham; P/O. K. H. G. Groves; Flt. Sgt. N. E. Powell; Sgt. R. C. Stone.

South African Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Lt. B. S. Thornhill-Cook.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Capt. D. Cobbledick; 2 Lt. P. C. De-Meillon; Air Sgt. S. R. Galloway; Lt. R. E. Jackson; Air Sgt. A. Kahn; Capt. R. Pare; 2/Lt. C. C. P. Steyn.

Casualty Communiqué No. 248.

Of the names in this list 109 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Sgt. J. G. P. Adams; Sgt. N. F. Bailey; Sgt. O. Batraclough; Sqn. Ldr. I. M. T. De K. Bocock; Sgt. R. Brown; Sgt. G. Dunn; Flt. Sgt. P. Inchcoombe; Sgt. V. A. Rice; Sgt. J. Riley.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. W. Barham; Sgt. J. W. Brown Sgt. D. Hanlon; F/O. C. O'Brien; Sgt. H. Smith; Act. Flt. Lt. R. W. A. Turtle.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. W. A. Arends; Flt. Sgt. R. Asquith; Sgt. D. Barkway; Sgt. P. W. Barrett; Sgt. A. H. D. Barton; Sgt. A. Bentley; Sgt. C. N. Bower; F/O. J. S. Bunbury; Sgt. L. R. J. Burrell; Flt. Sgt. W. R. Cook; Sgt. H. Dauncey; Flt. Sgt. K. E. J. Evans; Cpl. F. J. Few; Sgt. G. W. Franks; Sgt. J. E. Gorringe-Smith; Flt. Sgt. P. W. Gregory; P/O. W. F. B. Griffiths; Sgt. J. Grocock; Flt. Sgt. T. F. Grosvenor; Flt. Sgt. A. E. Groves; Sgt. T. G. Gunn; Sgt. H. R. Hallam; F/O. H. G. Jones; P/O. J. A. Leslie; Sgt. C. McKeand; Flt. Sgt. A. MacN. McKelvie, D.F.M.; Sgt. J. McKenna; Sgt. S. A. Marr; F/O. W. S. Marshall; Sgt. A. B. Norman; Flt. Sgt. W. Onions; Sgt. E. E. Patchett; Sgt. R. W. Payze; Sgt F. C. Pearman; P/O. P. Pearson; Sgt. R. T. Perrin; P/O. D. T. W. Phillips; Sgt. R. H. Richardson; Flt. Sgt. F. Roe; Sgt. M. B. Rogerson; Sgt. A. R. Scott; P/O. F. H. Shackleton; Sgt. P. Simpson; Sgt. R. Slimings; P/O. G. R. Stead; Sgt. D. G. Symons; Flt. Sgt. P. H. Thimblebee; Sqn. Ldr. H. R. Tidd; Sgt. N. Tomlin; P/O. L. Treppass; P/O. R. V. H. Tweedie; Sgt. H. H. Watson; Sgt. G. A. White; Sgt. R. C. H. White; Sgt. N. Windle; Flt. Sgt. K. D. Wright; Flt. Sgt. F. J. E. Womar, D.F.M.; P/O. C. I. A. Sandland.

MISSING.—Sgt. L. R. Akehurst; Sgt K. Ambler; Sgt. R. A. Asbury; Sgt. G. H. Austin; Sgt. D. R. Barber; Sgt. H. R. Barnes; Sgt. A. Barrie; Sgt. J. A. Bates; Sgt. F. V. Bayford; Sgt. J. Bayliss; Sgt. A. Beard; Flt. Sgt. R. Beavan; Sgt. A. W. Berry; Sqn. Ldr. F. C. Bertram; Sqn. Ldr. W. A. Blake; Sgt. W. C. Bostock; Sgt. B. T. Brett; F/O. W. C. Brisbane; Sgt. J. P. H. Brownlee; Sgt. N. Bruce; F/O. R. N. Capron; Sgt. C. H. Collins; Sgt. W. J. Colwill; Sgt. J. C. F. Cook; Sgt. G. S. Cooper; Sgt. J. Cooper; Sgt. K. Coulson; P/O. B. P. Cryer; F/O. A. Daley, D.F.M.; Sgt. E. F. Doolittle; P/O. W. J. Dowdell; Sgt. W. J. Drayton; Sgt. J. G. Duncan; Sgt. H. V. Durrant; Sgt. D. Edwards; Sgt. G. H. Edwards; W/O. J. G. Edwards; Sgt. A. K. Eley; Sgt. R. G. Elkans; Sgt. D. C. Farley; Sgt. A. P. Gielty; P/O. R. H. Glover; Sgt P. Grant;; Sgt. W. D. Griffith; Sgt. J. C. Haines; Sgt. R. Harrison; Sgt. R. E. Haywood; Sgt. H. R. Henley; Sgt. C. H. Herbert; Sgt. E. A. Higham; Flt. Sgt. R. Hill; Sgt. W. Holding; P/O. G. F. Jones; Sgt. K. W. Jury; Sgt. A. D. Kitchen; Sgt. A. Kleinhorn; Sgt. R. A. Knapman; Sgt. J. Lees; Sgt. A. O. Lewis; Sgt. N. E. Lind; Sgt. R. F. Lyster; Sgt. F. H. McConville; Flt. Lt. H. M. D. Magill; Sgt. J. N. McHarrie; Sgt. A. I. Mackay; Sgt H. F. McKeon; Sgt. A. D. McKilligan; Sgt. D. B. Martin; P/O. E. C. Milton; P/O. I. M. P. Morgan; Sgt. G. A. Nunez; Sgt. J. D. Olding; Flt. Lt. C. W. Parish; Sgt. C. Payne; Sgt. F. T. Peake; Sgt. T. Peat; Sgt. G. C. Peters; Sgt. G. M. Pettigrew; Sgt. L. Pickford; Sgt. R. G. Prince; Sgt. J. A. Proctor; Sgt. A. S. Quick; Sgt. W. D. Ramsay; Sgt. H. Ray; Sqn. Ldr. J. C. Richards; Sgt. S. Richardson; Sgt. G. E. Roberts; Flt. Sgt. J. Rodgers; Sgt. L. A. Rummery; Sgt. I. W. Sanderson; Sgt. R. C. St. Sees; Sgt. P. Shortland; Sgt. D. MacK. Smellie; Sgt. J. S. Spiers; Sgt. L. S. Staight; Sgt. J. Stephen; Sgt. R. W. Stockton; Sgt. N. Thompson; P/O. A. W. A. Trevarthen; Sqn. Ldr. E. F. Tyler; Sgt. D. A. H. Underwood; Sgt. W. N. Underwood; Sgt. C. Vandy; F/O. L. Walters; Sgt. F. C. Ward; Sgt. C. W. Warne; Sgt. J. J. Waulkhard; Sgt. D. Weight; F/O. W. B. Wells; Sgt. H. Wilford; Sgt. R. H. Winter; Sgt. L. J. Yeo.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. D. E. Hamlyn; F/O S. Hetherington; Sgt. W. P. Hoare; Sgt. J. M. Holmes; F/O. L. C. Hoslin; F/O. R. W. Moore; Sgt. A. C. Page; Sgt. L. J. Short; P/O. R. W. H. Stock; L.A/C. M. H. E. Washer; L.A/C. D. H. Washer; F/O. H. B. Waterson; Sgt. W. L. White; P/O. N. G. Woodward.

WOUNDED OR INJURED OR ACTIVE SERVICE.—Sgt. E. G. Clarke; F/O. J. R. Jones; Flt. Sgt. D. Masser; Flt. Sgt. T. Whetstone.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. K. Howarth; Flt. Sgt. D. A. McCluney; L.A/C. S. Schofield; Flt. Sgt. W. P. Whorlow.

DIED ON ACTIVE SERVICE.—Cpl. J. Harding; L.A/C. D. Harper; A/C.1 H. M. Hughes; L.A/C. W. J. Jones.

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. T. E. Exell.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. W. D. Bohl; F/O. R. C. Carson; Flt. Sgt. A. Greaves; Sgt. R. G. L. Holton; Sgt. J. F. Jacklin; P/O. G. R. Jones; Sgt. N. K. Judd; F/O. A. G. Macdonald; Sgt. A. M. T. Mears; A/C.1 W. E. Menzies; Sgt. P. O'Connell; Sgt. A. J. Pankhurst; P/O. N. H. Shillabeer; Sgt. A. Wotherspoon.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Flt. Sgt. K. C. Birdsey.

MISSING.—Sgt. L. N. Bain; Sgt. C. MacL. Brigden; Sgt. W. V. Chittock; Sgt. P. J. Cramer; Sgt. B. F. K. Green; Sgt. I. S. McLennan; Flt. Sgt. G. H. Webb.

KILLED ON ACTIVE SERVICE.—Sgt G. E. Boyes;

SERVICE AVIATION

Sgt. L. T. Cook; Sgt. L. N. Ingram; Act. Flt. Lt. A. I. Stuart.

Royal Canadian Air Force

KILLED IN ACTION.—Flt. Sgt. B. Anderson; P/O. D. R. McLean; Flt. Sgt. R. J. Taylor.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. B. P. Cardinal.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. E. Atkinson; Sgt. E. K. Brennan; P/O. G. H. Chaffey; Flt. Sgt. H. A. Chislett; Flt. Sgt. N. E. Costigan; W/O. W. H. Davies; P/O. F. R. Donnison; Flt. Sgt. R. E. Fuller; Flt. Sgt. R. A. A. Gorieu; P/O. A. H. Harris; Sgt. J. T. Hunter; Sgt. J. H. Kinch; Sgt. H. A. Macdonald; P/O. B. A. Miller; P/O. W. J. Ruddy; P/O. G. A. J. Ryckman; Sgt. A. Shepherd; Flt. Sgt. E. E. Sheppard; Flt. Sgt. L. Sidney; W/O. G. H. Smith; P/O. J. E. Sumpton; F/O. E. D. Vanier; Sgt. C. S. Walsh.

MISSING.—Flt. Sgt. W. G. Blight; Sgt. L. R. Coutts; Sgt. P. J. Cozens; Sgt. L. Dutton; Sgt. H. W. Fill; Sgt. S. G. Giffin; W/O. J. J. A. Guay; Sgt. L. G. Haines; Sgt. W. C. Hencke; Sgt. L. J. Krulicki; Sgt. I. Macdonald; F/O. N. M. McLellan; Flt. Sgt. J. S. Marshall; Sgt. J. Paplowski; Sgt. F. H. Pilon; Sgt. A. Podolsky; Sgt. N. O. Robinson; Sgt. J. A. Smith; Sgt. E. Stranberg; P/O. E. R. Vance.

KILLED ON ACTIVE SERVICE.—P/O. J. E. L. Cantin.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. A. J. Lassner.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. S. H. Lincoln.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. L. McK. Scott.

KILLED ON ACTIVE SERVICE.—W/O. T. B. Blackburn, D.F.M.

South African Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Lt. R. Cameron; Capt. J. P. Furstenburg; Air Sgt. P. L. Mathieu.

MISSING.—Lt. P. M. Bown; Lt. W. Boyle; Flt. Sgt. R. K. Brown; Flt. Sgt. T. Jenkinson; Lt. D. Segal.

Indian Air Force

KILLED ON ACTIVE SERVICE.—P/O. M. K. Chand.

Casualty Communiqué No. 249.

Of the names in this list, 101 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Act. Flt. Lt. B. T. Bland; Sgt. J. R. Callan; F/O. R. Chandler; F/O. W. K. Clarke, Sgt. E. V. Cope; Sgt. F. T. Davies; Sgt. J. Doy; F/O. W. H. Ormsby; P/O. R. G. Roberts; Sgt. B. A. Rogers; Flt. Lt. J. H. M. Shaw; Sgt. W. Skelton.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. C. H. Brummitt; P/O. J. P. Carter; Sgt. T. Douglas; Sgt. H. J. Endley; Sgt. F. V. Harker; Sgt. B. Quinn; P/O. A. R. Simpson; Sgt. W. E. Spooner.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. J. Armstrong; Sgt. R. E. Barr; P/O. R. C. E. Bassom; Sgt. J. C. Bennett; P/O. F. J. Blackwood; Sgt. C. W. Bourke; Sgt. A. R. Bowen; Sgt. C. A. Bowes; Sgt. R. A. Coward; P/O. R. M. Cundy; P/O. R. H. Curran; Sgt. L. Dent; Sgt. W. McF. Drummond; Sgt. A. T. Fraser; Sgt. G. A. Gow; Sgt. L. C. Gray; P/O. G. J. Hains; Sgt. E. R. Harding; Sgt. R. J. C. Hazelton; Sgt. J. K. L. Heath; Sgt. A. C. P. Knowles; Sgt. S. Lang; Sgt. T. A. McGrath; P/O. P. S. MacKay; Sgt. J. McI. McLaren; Sgt. J. W. Melhuish; Sgt. D. Miller; Act. Flt. Lt. A. G. De B. G. Monk; Sgt. D. J. Monk; Sgt. W. C. Nugent; Sgt. D. N. O'Day; P/O. A. F. O'Donnell; Sgt. J. T. Plant; Sgt. R. D. Proctor; Sgt. R. Robson; Flt. Sgt. D. Rose; Sgt. T. E. Rowan; P/O. J. W. Scott; P/O. H. M. Simon; P/O. W. R. Smithyman; P/O. A. J. Southwell; Sgt. F. G. Spenceley; Sgt. R. D. Stevenson, Sgt. D. J. Ware; Sgt. C. S. Weston.

WOUNDED OR INJURED IN ACTION.—Flt. Sgt. F. H. Westbrook.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. D. W. Perry; Flt. Sgt. P. J. Pitchford.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. W. W. Bannatyne; Sgt. H. Buxton; Sgt. R. Dunn; Sgt. G. W. Hancock; Sqn. Ldr. F. A. Holmes D.F.C.; Sqn. Ldr. J. Latimer, D.F.C.; Sgt. W. T. McLean; P/O. J. McMaster; Sgt. R. H. Pallender.

MISSING.—Sgt. J. Alderdice; W/O. H. R. Anderson; Sgt. D. F. R. Banks; Sgt. C. B. Barrott; P/O. K. W. Bordycott, D.F.M.; Sgt. L. R. Bray; Sgt. S. J. Briffett; Sgt. P. L. Brougham-Faddy; Sgt. R. Brown; P/O. V. G. Brown; Sgt. R. C. Burt; Sgt. A. Chadwick; Sgt. G. W. Cole; Sgt. B. W. Cooper; Sgt. E. W. Cox; Sgt. E. R. Davidson; Flt. Sgt. H. Davidson, D.F.M.; Sgt. W. W. Dawson; Sgt. F. W. Day; Sgt. G. L. Doidge; Flt. Lt. D. J. Donaldson; Sgt. A. K. Edgar; P/O. J. F. Edwards; Sgt. R. V. Emerson; Sgt. G. Errington; Sgt. H. Evans; Sgt. K. Evans; Sgt. N. L. Fauvel; Sgt. H. C. Fazakerley; Sgt. G. R. Fernee; Sgt. M. J. Fitzgerald; Flt. Sgt. G. Gill; Act. Wing Cdr. I. R. Gleed, D.S.O., D.F.C.; Sgt. B. H. Gooding; P/O. P. M. Gordon-Crosby; P/O. G. Griffiths; Sgt. E. G. Hammett; P/O. C. D. Handley, D.F.M.; Sgt. A. M. Hodges; Sgt. D. A. Holdsworth; Sgt. S. J. Houston; Sgt. H. J. Humphreys; P/O. B. C. Ings; Sgt. J. B. McM. Irving; Sgt. L. Johnson; Sgt. D. L. Jones; Sgt. H. E. Jones; Act. Flt. Lt. W. A. Jones; Sgt. E. J. Kimberley; Flt. Sgt. A. E. King; F/O. F. W. Larcey; Sgt. H. F. D. Lay; Sgt. D. R. Ling; P/O. J. E. McCrea; P/O. W. McFarlane; Sgt. R. A. McLaren; Sgt. W. D. Mayor; Sgt. G. S. Meldrum; Sgt. J. R. Milne; Sgt. J. Monks; Sgt. B. L. Neal; Sgt. K. Norris; Sgt. P. R. Olliver; Sgt. D. O'Loughlin; Flt. Lt. W. J. Parsons; Sgt. D. I. Pullen; Sgt. J. V. Rees; Sgt. R. W. Robinson; Sgt. W. A. Rogers; Wing Cdr. W. P. Shand; D.F.C.; Flt. Sgt. J. E. C. Simpson; Sgt. L. E. Smedley; Flt. Sgt. A. K. Smith; Sgt. B. Smith; P/O. F. Smith, D.F.M.; F/O. D. A. Sparrow; F/O. D. G. Spencer; Sgt. J. T. Stephens; P/O. F. R. H. Tate; Sgt. R. M. Tullett; Sgt. H. A. Upton; F/O. A. P. F. Waddington; Sgt. C. Walker; F/O. R. G. Wallis; W/O. R. W. Ward; Sgt. A. F. Warner; Sgt. R. H. Wells; Sgt. R. K. White; Sgt. K. R. A. Whitcombe; Sgt. L. Whyatt; F/O. C. F. Williams; P/O. G. H. Willis; Wing Cdr. V. C. Wood, A.F.C.; Flt. Sgt. W. O. Woolnough.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. E. Vevers.

KILLED ON ACTIVE SERVICE.—Flt. Lt. C. R. Barrett; Sgt. F. O. Bonham; A/C.1 H. A. Burston; Sgt. E. A. Clyde; Sgt. R. S. Cordingley; F/O. B. T. Davies; Sgt. S. Dawson; L.A/C. J. H. Evans; L.A/C. L. E. Genower; Sgt. J. L. Gunn; W/O. J. R. Harvey; Sgt. W. S. Humphreys; P/O. L. Lane, Sgt. J. R. Mason; Sgt. H. J. Newman; P/O. A. C. Sawdy; Sgt. W. S. Stanbury; P/O. K. Wade.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. E. McDonald.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—L.A/C. D. Beattie; Sgt. J. Croll; Sgt. J. McGovern; L.A/C. J. W. McKinnie; Flt. Sgt. A. R. T. Phillips; A/C.1 T. E. Williams.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. S. S. Atkins; Sgt. E. A. Barton; Sgt. S. Clegg; L.A/C. J. Lynes; A/C.1 A. J. Roe; A/C.1 W. I. Simpson.

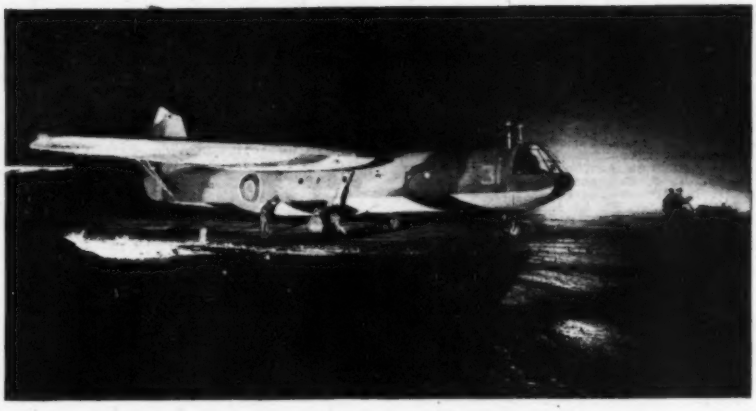
DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—F/O. P. H. J. Grove.

DIED ON ACTIVE SERVICE.—A/C.2 A. H. Birch; L.A/C. J. Fleming; A/C.2 I. Linstead; W/O. J. B. L. McLean; A/C.2 F. J. Mason; Flt. Lt. H. Newman; L.A/C. C. H. J. Payne.

Royal Australian Air Force

KILLED IN ACTION.—Sgt. G. J. H. Carter.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. R. J. Biglands; Flt. Sgt. H. E. Birk; Sgt. J. H. Dinning; F/O. J. W. Keene; Sgt. A. S. Millis; Sgt. R. F. Waldon.



NIGHT MANŒUVRES: Towing Horsa gliders to the take-off point for night flying.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. A. F. Ada; Sgt. N. H. Cox; F/O. W. M. Edmonds; Sgt. G. R. Gahan; Sgt. J. A. Gaiter; Sgt. W. J. Halliday; Sgt. S. L. Hore; Sgt. J. B. Mathers; Sgt. J. K. Paton; Sgt. K. H. Poynting.

MISSING, BELIEVED KILLED IN ACTION.—P/O. I. C. Mackenzie.

MISSING.—Flt. Sgt. R. H. Baker; W/O. W. R. K. Charlton; Sgt. B. Finnane; Sgt. B. H. Harvey; P/O. G. B. Herring; Sgt. A. K. James; Sgt. P. J. Keay; Sgt. B. Kinlands; P/O. E. A. Mahoney; Flt. Sgt. C. K. Menzies; Sgt. B. M. Muir; P/O. C. O'Connel; P/O. A. K. Parker; Sgt. J. S. Stewart; F/O. T. M. Taylor; P/O. C. F. Tozer; Flt. Sgt. F. H. Ward; P/O. D. E. White.

KILLED ON ACTIVE SERVICE.—A/C.1 F. L. Baxendale; Sgt. A. C. J. Lamond.

WOUNDED OR INJURED ON ACTIVE SERVICE.—L.A/C. G. H. Boyd; A/C.1 W. J. M. Collett; Flt. Sgt. G. J. Talbot.

DIED ON ACTIVE SERVICE.—Flt. Sgt. R. H. Malcolm.

Royal Canadian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. V. H. Miller.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. J. W. Brown; Sgt. T. H. Clarke; Sgt. E. B. Egan; Flt. Sgt. L. Foster; P/O. C. W. Harp; Sgt. R. G. R. Hodges; Flt. Sgt. W. McI. McLachlan; Flt. Sgt. J. A. McLean; Flt. Sgt. R. H. McRae; Sgt. T. C. Barry; P/O. D. R. Rehill; P/O. D. F. Rouleau; P/O. C. W. Simmons; P/O. E. A. Smith; F/O. D. J. Quinlan; P/O. J. C. Watson.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—P/O. R. P. McLaren.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. W. A. Lyttle; F/O. G. A. McNichol.

MISSING.—Sgt. F. J. M. Ashdown; Flt. Sgt. G. H. Bartman; Sgt. W. L. Canter; P/O. R. F. Collins; Sgt. J. H. Fitch; Act. Flt. Lt. G. A. Lunn; Sgt. P. G. McCardle; Sgt. C. McKerns; Sgt. C. L. Maunder; Flt. Sgt. W. J. Reddie; Sgt. D. S. Ritchie; Sgt. D. J. K. Wallace; Sgt. P. Whitnall; Flt. Sgt. G. K. Young.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. J. B. Reid.

KILLED ON ACTIVE SERVICE.—Sgt. W. D. Bates; Act. Sqn. Ldr. H. S Hill, D.F.C.; Flt. Sgt. R. L. Locker; Sgt. H. D. E. Messier; Sgt. E. W. Pitt.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW REPORTED KILLED ON ACTIVE SERVICE.—Flt. Sgt. J. A. McMillan.

Royal New Zealand Air Force

KILLED IN ACTION.—Sgt. W. A. Cook.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. J. W. Chapman.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. W. J. Barnes; P/O. R. J. Smith.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—Sgt. J. C. Williams.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. E. W. Evans.

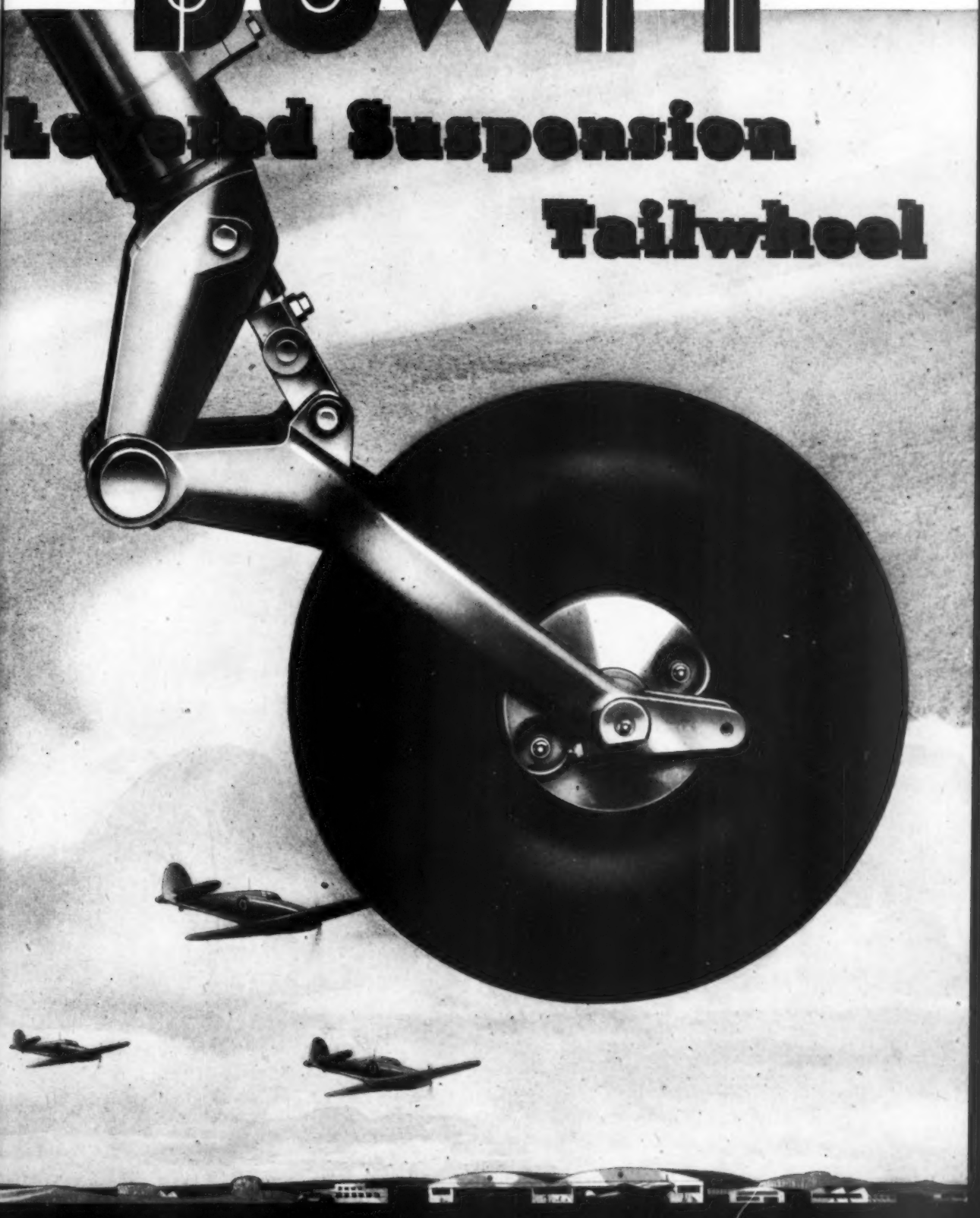
South African Air Force

MISSING.—Lt. V. Mundell.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Flt Sgt. A. B. Furman.

DOWTY

Levered Suspension Tailwheel



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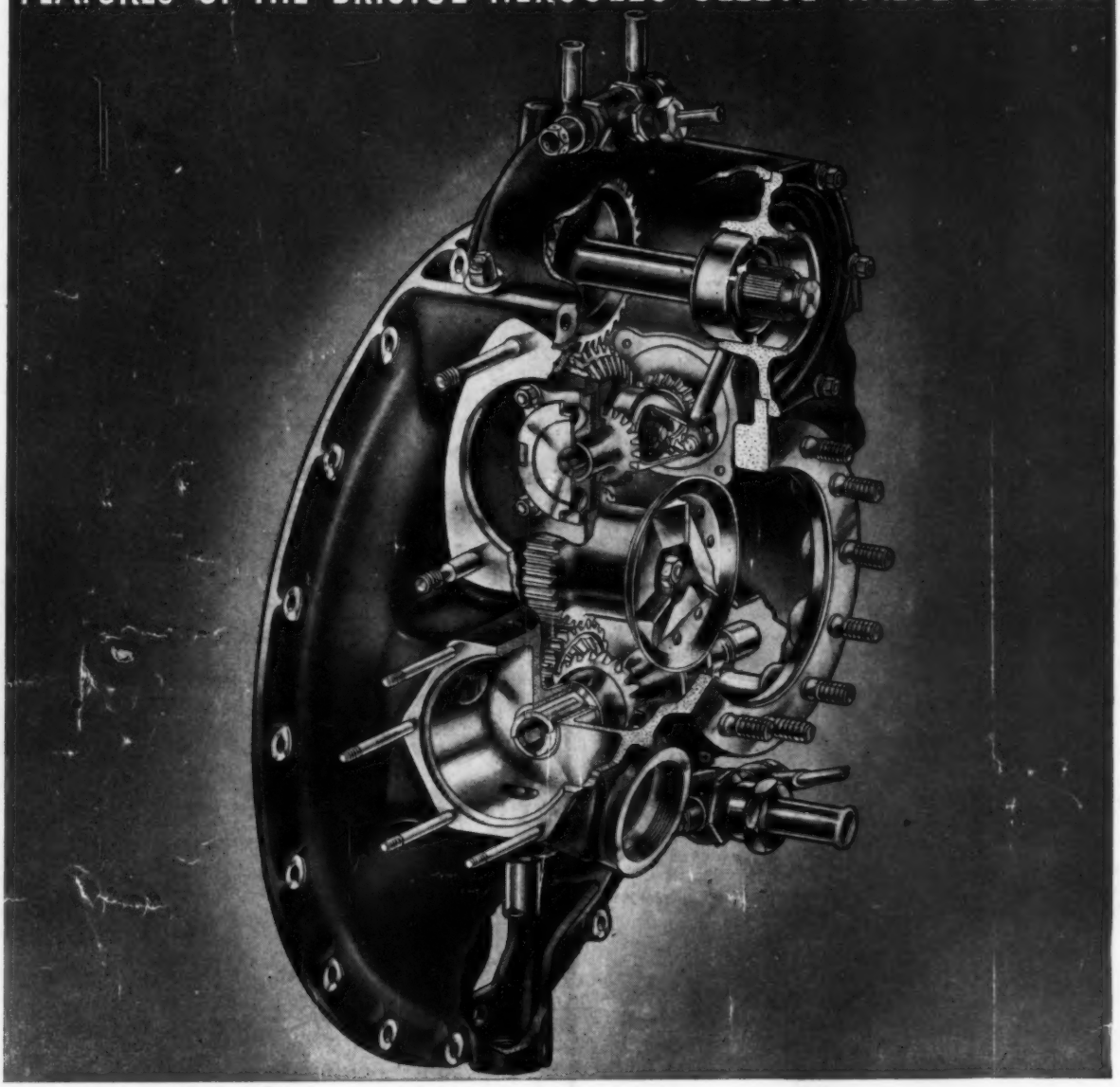

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